DOCUMENT RESUME

ED 055 592 LI 003 146

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TITLE	Collecting and Reporting Real Costs of Information Systems.
SPONS AGENCY	American Society for Information Science, Washington, D.C. Special Interest Group on Costs, Budgeting and Economics.
PUB DATE	Nov 71
NOTE	160p.; (3 References); Paper prepared for the Tutorial Session at the 1971 Annual Meeting of the American Society for Information Science
AVAILABLE FROM	American Society for Information Science, Attn: SIG/CBE, 1140 Connecticut Avenue, N. W., Suite 804, Washington, D. C. 20036 ($6.00)
EDRS PRICE	MF-$0.65 HC Not Available from EDRS.
DESCRIPTORS	*Budgeting; *Costs; Economics; Information Centers; *Information Services; *Information Systems; Models; Systems Approach; *Unit Costs

ABSTRACT

This document attempts to provide managers and designers of information systems with a usable, practical "building block" system for unit costing. The model is sufficiently flexible to be applicable to a wide variety of cost control requirements; costing elements include project, product, account, organization and function. Design of the cost system involves knowledge of basic principles and the system reporting formats, product structure and counts, function roles, non-production costs and allocations. The next steps are identification of product lines, tagging cost elements and conducting trial runs. System implementation requires design parameters which reflect human limitations, controls, and staff education and orientation. In forecasting it is equally important to know what not to do as how to do it. The design and installation of the described cost system will produce fringe benefits which themselves almost justify the expenditures. Fourteen appendices provide working tools for system utilization. (AB)

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COLLECTING AND REPORTING REAL COSTS OF INFORMATION SYSTEMS

by

Douglas S. Price

NOVEMBER 1971

SPONSOR: THE SPECIAL INTEREST GROUP ON COSTS, BUDGETING AND ECONOMICS (SIG/CBE)

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COLLECTING AND REPORTING REAL COSTS OF INFORMATION SYSTEMS

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Douglas S. Price

Prepared for the Tutorial Session

Sponsored by

The Special Interest Group on Costs, Budgeting and Economics

at the 1971 Annual Meeting of the

AMERICAN SOCIETY FOR INFORMATION SCIENCE

November 1971

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TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. ELEMENTS FOR COSTING 2

A. Project 2
B. Product 2
C. Account 5
D. Organization 5
E. Function 6

III. COST SYSTEM DESIGN 7

A. Basic Principles 7
B. Knowing the System 9
C. Reporting Formats 12
D. Product Structure.....19
E. The Role of Functions 21
F. Production Counts.....22
G. Non-Production Costs 25
H. Allocations 28
I. Identifying Product Lines 30
J. Tagging Cost Elements 33
K. Dummies and Trial Runs.....36

IV. IMPLEMENTATION 38

A. Design Factors 38
B. Controls 40
C. Tools 42
D. Orientation 45

V. FORECASTING 47

A. Requirements for Forecasting 47
B. Cautions 50

VI. FRINGE BENEFITS 53

A. Knowledge of System 53
B. Awareness of Cost 53
C. Controls.....53
D. Morale 53

LIST OF APPENDICES

APPENDIX A - Typical Information System Building Blocks

APPENDIX B - Information System Product Definitions

APPENDIX C - Typical Account Structures

APPENDIX D - Typical Organization Code Structure

APPENDIX E - Typical Information System Functions

APPENDIX F - Materials Balance and Process Flow Charts

APPENDIX G - Unit Cost Reportin Formats

APPENDIX H - Typical Product Numbering Scheme

APPENDIX J - Typical Functional Unit C st Report Formats

APPENDIX K - Typical Production Reports

APPENDIX L - Typical Validity Lists

APPENDIX M - Input Forms

APPENDIX N - Production Schedules

APPENDIX P - Cost and Volume Projections

I. INTRODUCTION

In recent years there has been considerable interest in, and writing on, the subject of costing information systems. Unfortunately, most of this writing, when it hasn't been strictly theoretical in nature, or couched in vague general terms, has been plagued with unstated assumptions, omissions of crucial information, or errors in logic. As a result, very little of what has been published has been of any use to information system operators or designers in their sincere efforts to find out what it really costs to run an information system and how they can price their services and products on a rational basis.

This document is an attempt to provide managers and designers with usable, practical help in costing information systems by describing in detail the philosophy, development and practice of a so-called "building block" system for unit costing which has evolved in actual use in Government circles for over six years. While the system described herein is not by any means offered as a general panacea or model to be followed in all situtations, it does seem to offer sufficient flexibility to be applicable to a wide variety of cost control requirements.

Its capability for precision has also been proved in actual use. Year-to-year projections of unit costs have, on the whole, been shown by subsequent history to be accurate within tolerable limits, except where marked variations in volume from the projected figures or equally identifiable changes in operational techniques or policy have invalidated the assumptions inherent in the forecasts.

The extent of the transferability of this experience remains to be seen. It is our--perhaps, overly optimistic--hope that this work might, after considerable refinement based on wide application, provide a basis for achieving a measure of standardization in reporting costs of information systems. However, if we can only stimulate pragmatic, down-to-earth discussion--even controversy--on the subject, the effort will have been well rewarded.

II. ELEMENTS FOR COSTING

Most cost systems identify an item of cost by several kinds of tags. Generally, these are: Project, Product, Account, and Organization. For Information Systems costing, a fifth tag is recommended. This is Function. In order to provide a foundation for the ensuing discussions, these are discussed below.

A. Project

This tag identifies a major or significant set of the activities being costed. In government-oriented activities, it may identify a particular contract or research effort. In commercial activities, it might be a product line or production for a certain class of customers.

B. Product

1. General

This tag identifies a subset of a project. Usually, this is a coherent activity or set of activities contributing to a specific goal or output. It is in this area that Information System costing differs most markedly from most production operations. Rare indeed is the information system where the inputs have a consistent one-to-one relationship with the outputs. Therefore, the definition of products in Information Systems must be more restricted.

2. Information System Products

a. The Building Block Concept

Since Information Systems are almost universally subject to varying workloads, the most effective approach to costing seems to be unit costing. However, the lack of a one-to-one relationship between inputs and outputs makes it necessary to select for unit costing relatively small elements which constitute building blocks from which final costs for an output can be "assembled". A close (though by no means perfect) analogy is the automobile industry where costs for various body styles, engines, transmissions, and other options are "assembled" to determine the cost of the complete automobile. A closer analogy might be the aircraft industry where a given airframe may be rigged for cargo or equipped with various proportions of first class and coach seats or

a given seat design may be used on a variety of airframes. Proper selection of building blocks for unit costing can provide precise, useful cost information without significantly impairing the flexibility needed to respond to changes in the volume and nature of the workload.

b. Categories

The building blocks for information system costing can be categorized as follows:

(1) Inputs - Activities which contribute to the building or maintenance of the information store.

(2) Outputs - Activities which draw on the information store to produce information products for users.

(3) Collateral Services - Activities not necessarily dependent upon the created information store, e.g. document dissemination in either microform or hard copy (documents not surrogates); user (customer) records; etc.

(4) Specials - Activities which are ad hoc in nature or which support the system itself (see also Burdens below).

(5) Burdens - Activities which are essential to and support the system as a whole, e.g. Management and System Development activities.

While there are, of course, interrelations and mutual dependencies among the categories, it can be stated with considerable assurance that a valid building block will not cross category lines.

c. Definition

For the purpose of costing Information Systems, a product represents a coherent set of activities which usually result in the production of identifiable, like (or very similar) units which can be counted. Generally, (but not always, See Functions below), the productivity of the individual activities of the set can be measured by a count of the same units. However, in most information systems, there will be activities which support several products and which have no meaningful count measure for their output. These should be considered products for the purpose of collecting their costs, which can

then be distributed to the products they support on some rational basis.

3. Examples

The building block concept can probably be communicated most effectively by illustration.

a. Appendix A is an attempt to identify all of the building blocks which might make up an Information System. Under the five categories noted above, parallel entries are established for an Information Center and a Conventional Library. One would not normally establish every applicable line entry in Appendix A as an independent product, but on the other hand, a single line entry might apply to several products.

To illustrate, on the Information Center side, for a single type of input, say, Research Reports, the activities of Surrogation, Input Preparation, and File Update might be a single product. The details might be identified by Organization, Function, or both. If the same center also processed Journal Articles, those same activities applied to those inputs would be another product. The activities of Acquisition, Input Processing, and Authority File Maintenance would be collected as separate products which would be allocated among the various input streams. The basis of allocation might be the number of accessions in each class added to the file, but the circumstances of the particular situation might well call for a different basis.

b. Application of the building block concept to an actual operating information system is illustrated by the product definitions in Appendix B. The manner in which various activities are identified within these classes is exemplified by the sample Process Flow Charts on pages 3 through 6 of Appendix F and their accompanying narrations. It should be noted that these product definitions are very atypical in several specific areas as noted below, nevertheless, they serve to illustrate the principle.

(1) The first product, Accessions to File, collects virtually all inputs into a single class. This was possible only because costs and statistics had been collected and analyzed separately for each class over periods of up to five years, and this history showed a virtually constant mix in the input. Similarly, statistics collected over a period of years showed a constant proportion (within a percentage point or two) of author abstracts, so that the product Abstracts Announced could include both author and

in-house abstracted items as a mixed class. This approach was used in a number of these products. A new or rapidly evolving operation would require a much more detailed breakdown.

(2) The products listed omit two vital activities - Vocabulary Maintenance and Acquisitions. The former is omitted because a major revision of the NASA Thesaurus was under way as a separtely funded project; the latter because, at the time and as the operation was then constituted, we could find no rational way to allocate acquisitions costs between Request Processing (a major program at the NASA Facility) and Accessions to File.

C. Account

Accounts are the classes by which costs must be collected for the purpose of maintaining an organization's financial records, providing control and identification for audits, etc. Typically, they are in four broad classes: Direct Labor; Direct Materials & Supplies; Other Direct Costs; and Indirect Costs. Almost invariably, these are further subdivided into more specific subsets with varying levels of detail, depending upon the organization and circumstances. Appendix C includes typical lists of accounts for a large organization and for a small one. These structures vary not only in level of detail, but in which of the major categories a given cost goes into. In the large organization, Occupancy was considered an Indirect Cost, while the smaller treated it as Direct. On the other hand, both of these organizations accrue Vacation as a Direct Cost, while many, if not most consider this an Indirect Cost.

In comparing unit costs between organizations, these differences are extremely significant, and probably account for at least some of the apparent inconsistencies in reported costs.

Appropriate selection of account codes (when they are not dictated by the requirements of a larger organization) can facilitate preparation and use of cost reports. Note that the two schemes presented in Appendix C provide detail, but permit easy summarization by the broader class, using the second (from the right) digit of the account code as a collector.

D. Organization

For any except small organizations, some kind of organizational structure is necessary. Even a small information center or library, if it is a part of a larger organiza-

tion and obtains services from other elements, will find organizational tags useful in validating or reviewing costs. In accounting systems, the organizational tag applied to a cost transaction is the organization which originates the cost by submitting a time card (labor), signing a purchase order (materials, etc.) or operating equipment (computer). Note that the originator may or may not be the benefitting organization.

Appendix D shows the organizational code structure of the NASA Scientific and Technical Informational Facility as of the fall of 1967. This, of course, was a very large organization (over 300 people), and required a more complex structure than most information centers. Note that, here again, the hierarchical arrangement of the code permitted intermediate summarization at Branch, Departmental, and Divisional levels, and that a complete organizational chart of the Facility can be drawn from the information shown.

E. Function

Functions (applied to Direct Labor only) identify what the individual is doing to the item being costed (e.g. Duplicate Checking, Descriptive Cataloging, Indexing, etc.). While it is not common in cost systems, it has been found extremely valuable in tracking the costs of information systems, particularly small ones where a single individual may perform several functions. For example, the cost of processing documents without Author Abstracts may be distinguished from the cost of processing those with Author Abstracts by using the function Document Analysis with Abstracting for the former and the function Document Analysis (Author Abstract) for the latter. This permits treating both as a single product, which is desirable since the end result is the same.

Appendix E contains a partial list of the functions used at the NASA Facility during Fiscal Year 1967 and a much simpler list currently in use at the ERIC Processing and Reference Facility. Aside from the level of detail, there are differences in philosophy between the two lists. Partly, these are due to evolution, but they also point up the fact that the determination of what constitutes an identifiable function must be made on the basis of a particular situation.

4. No matter how carefully the system is designed, when it is implemented, there are going to be changes. These must be allowed for in the design and in estimates of implementation and operating costs.

5. Unit costing demands production counts which are:

a. At least as accurate and as well documented as the costs.

b. Valid measures of the effort being costed.

c. Readily relatable to the costs.

Production counts are discussed in more detail in Section F below.

III. COST SYSTEM DESIGN

Before we can get into the actual steps of cost system design, there is a great deal of preliminary information which we must get under our belts. This information is discussed in Sections A through H below, before we begin the actual design steps in Section I.

A. Basic Principles

It must be recognized at the outset that the design of the cost system is inextricably interwoven into the design of the information system itself. Ideally, they should be designed together, but, of course this is seldom possible.

1. The primary constraint upon the design of cost systems for information systems is the general accounting system used by the overall organization. In the first place, it is doubtful that a useful unit costing system can be built on a manual accounting system. Even if the general accounting system is mechanized, if it does not have room for at least four (and, preferably, all five) of the cost element tags discussed in Section II, or if it does not have the appropriate sort and summarization capability, unit costing may be extremely difficult. Modification of the general accounting system or development of an adjunct system which provides the necessary capability may be required.

2. "You can always summarize from detail, but you can't extract detail from summaries". This is another way of saying that the level required for reporting to the customer or top management is probably not sufficient detail for operational monitoring of unit costs, determining the impact of changes, or cost effectiveness studies. Like most generalities, this can be overemphasized. Imposition of too much detail -- particularly, in personnel time records -- will almost invariably result in meaningless numbers, to say nothing of excessive costs.

3. It costs money to collect, analyze, and report unit costs, and the amounts are substantial. All too often, it is assumed that "collecting costs is the Accounting Department's problem", and since this is a burden, it is ignored. The fact is that the additional detail in cost recording and the required production counts are going to eat into the productivity of the workers, and increases in "the Accounting Department's" costs will inevitably be reflected by increases in the burden.

B. Knowing the System

Before the building block concept can be applied to an information system, it is necessary to know what is going on in the system. Every input and every output must be accounted for and every step of the processing of each. When balancing input/output volume estimates can be attached to each step, then the basis for a unit cost system exists. Of the various tools available for accomplishing this, the following have been found quite useful;

1. Materials Balance Charts and Tables

a. Page 1 of Appendix F is a fairly typical example of a Materials Balance Chart for an information system.(1) Each block represents an activity with one or more inputs and one or more outputs. The numbers are gross estimates of annual volume for each flow. Ideally, in such a diagram, inputs to each block should be exactly balanced by outputs, or differences explained. Such a diagram permits ready visualization of the process flow and identification of products for unit costing and counting purposes.

If one looks at the Issue Assignment block, it is immediately apparent that the identification of building blocks to the right of this block must be substantially different from the treatment to the left. Prior to accessioning most of the documents are treated in essentially the same manner and tracking the individual series through these processes would be difficult, if not impossible. On the other hand, to the right of accessioning, it not only becomes desirable, even necessary, to track the individual accession series, but provision must be made for tracking branchings within a series (e.g. Author Abstracts vs. Facility Abstracts). Other information valuable to costing (such as double count points and return loops) is displayed throughout the diagram.

b. If a sufficient statistical base exists, the gross numbers can be refined into tabulations similar to the Materials Balance Table (excerpt) on Page 2 of Appendix F. Note that the volumes displayed here were derived by statistical analysis of actual experience (See Part V), and differ from the gross estimates shown on the dia-

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(1) The inconsistencies between this chart and the ensuing discussions result from several years of evolution. They do not affect the chart's value as an example.

gram. Analyses such as this are invaluable in estimating costs for future operations.

2. Process Flow Charts

Pages 3 through 6 of Appendix F display samples of Process Flow Charts developed at a later stage in the Facility's evolution. Since they were prepared for publication, they lack production volumes, but these could be easily added to determine materials balances. These more sophisticated charts also represent a number of significant changes in outlook and structure:

(1) With several years of detailed statistical and unit cost history, it had become possible to combine a wide variety of products into a manageably small number, by, for instance, establishing an "average" accession to file for all types of inputs. This convenient fiction had the virtue of simplifying by nearly an order of magnitude the detail required for unit costing. Of course with this detail gone we could no longer perform some analyses on current throughput, but it was felt that there was sufficient stability to make them unnecessary. On the other hand, Document Reproduction was split from Request Processing, because the significant factor had proved to be the number of pages reproduced rather than the number of reproduction requests.

(2) An entirely new cost and statistical reporting system had been designed expressly for the NASA Facility and the products then being produced (See Appendix B). This quite complex (and quite expensive) Process Cost Accounting System involved, among other things, a monthly Work-In-Process (WIP) inventory of all in-process items at every work station. This approach requires: first, a very large operation to support the cost of development and operation; second, a relatively stable environment; and third, complete control over and a detailed knowledge of system flows.

Nevertheless, this approach to documenting the system for the purpose of understanding and costing has validity even for smaller systems. Note that for each product, the diagram identifies which organization does what and where. The tabulations which accompany the narrations with only the addition of production quantities, could be sorted (by organization, for example) and listed to permit determining manning requirements or a variety of other resource allocations. This type of representation has additional value in that it has a tendency to show up poor layouts which may impede efficient processing. On the other hand, it is impossible to obtain an overall picture. Any attempt to overlay all of the 26 process flows at the NASA Facility would have resulted in a meaningless jumble.

C. Reporting Formats

With the system thoroughly documented and (hopefully) understood, we move to the other end of the process to examine the final output we are seeking, since this will materially affect the system design.

Appendix G includes several representative unit cost reports. Please note that these are all demonstration samples which have been artificially constructed for this discussion. "The formats are true -- the numbers have been changed to protect the corporations." Page 1 is the unit cost report currently in use at the ERIC Facility. Pages 2 through 8 are excerpts from the 70-odd page unit cost report produced at the NASA Scientific and Technical Information Facility during the early stages of development. Pages 9 and 10 are the unit cost report used at the NASA Facility after implementing product simplification and the work-in-process accounting system.

These three widely disparate reports have two major areas of commonality. First, and most important, is the point that in each case, the line labelled Total Cost, is, in fact, just that -- the toal cost of the system for the period covered. The second is the pattern of having the elements of cost in columns across the page and the products or product classes in lines running down the page. This seems to be the most useful format for both assembly and interpretation.

Let's go back to page 1 of Appendix G and examine this report in some detail, as representative of the principles we are trying to establish.

1. Columns (Cost Elements)

Neglecting Column A which displays the product figures used for determining unit costs, the columns represent the detail elements of cost from which the report is constructed.

a. Direct Labor and Fringe (Columns B & C)

Almost all cost reports separate Direct Labor from other cost elements. Presumably, this is because this is the most sensitive element in terms of change and the most likely to require careful control. Fringe may or may not be stated as a separate entry, depending upon the burden structure.

b. Other Direct Costs (Columns D through G)

The division of these costs into separate elements is almost completely arbitrary and depends in large measure upon which elements management (or in this case, the customer) is interested in monitoring. It can, of course, be changed at will to suit the needs of the moment, provided the account structure separates the particular costs of interest. Note that additional detail on the make-up of Other (Column G) is provided in Note 1 to the right. This is to permit ready reconciliation with the Expenditure Report or invoice. These costs are not shown in individual columns for several reasons, among which are: the desire to keep the report on a single sheet and still readable; and minimal added information (i.e. nearly two-thirds of these costs are represented by a single entry in the Management and General line.)

c. Subtotal Direct (Column H)

This subtotal appears principally because it provides the basis for the Management Distribution accomplished in the following column, but it also marks a distinct division between two classes of cost. In general, the manager can exercise substantial control over the costs recorded to the left of this column. However, the costs recorded to the right are progressively less under his direct control, even though they can significantly affect his unit costs.

d. Distributions (Columns I, J, and K)

These columns are provided to permit transfer or allocation of costs collected in one product class to one or more other product class(es). These will be discussed in detail when we work our way down the lines of the report. For the moment, it is only necessary that we note that the negative entries (in parentheses) in each column zero out the positive entries so that the toal of the columns is zero and there is no change in total cost as a result of these distributions.

e. Subtotal, Direct and Distributions (Column L)

This column provides the basis for applying G & A, but note that the total is the same as Column H, verifying that the distributions have not changed net cost.

f. General and Administrative (Column M)

This represents corporate expenses for services such as Accounting, Purchasing, and the Personnel Office, as well as upper management and so on. It is almost universally applied as a percentage of all other costs. Care should be taken to distinguish between the budget (or bidding) rate announced at the beginning of a fiscal year, and the actual experience encountered during the year. The two are almost never precisely the same and are occasionally disastrously different. A careful manager will track and include in his reports the actual experience to date to avoid nasty surprises.

g. Subtotal, Direct and G & A (Column N)

This represents the total of costs incurred and forms the basis for determination of fee (or profit).

h. Revenues (Columns O and P)

At this point, a substantial difference will probably exist among the kinds of entries for a Facilities Operation Contract (as in the example), a commercial operation, and an internal service group.

(1) Facilities Operation

In this case, Column O will usually be (as in the example) identified as Fee, which is usually applied as a percentage of cost incurred. Column P will then be Total Cost to the client (as opposed to costs incurred by the operating organization).

(2) Commercial Operation

Here, Column O might be revenue figures for each product line, and Column P profit figures determined by subtracting Column N from Column O. The report then shows the profitability (or lack of it) of individual product lines, as well as the overall profitability of the entire operation.

(3) Internal Service Group

Such an operation might well omit Columns O and P altogether, and use the unit costs in Column N as a basis for charging its users for services.

2. Lines (Product Classes)

Each line of the report represents a product class under which costs have been collected. There are three types of lines in the report. Lines for product classes for which unit costs are calculated are lightly shaded in the top half where expenditures are entered. Unit costs, calculated by dividing costs by the production quantity at the left end of the line, are entered in the unshaded area where they will stand out. Lines for product classes which are transferred or allocated to other products have heavily shaded borders and, beyond the negative entry which zeroes out the line, are blocked out entirely. Lines for product classes which are neither susceptible to unit costing nor transferred are unshaded.

The five groups of product classes, as indicated by the labels at the left margin, are discussed in the following paragraphs.

a. General

The first of this group of product classes is Management and General, representing the cost of: (1) the Director and his staff, vacations, holidays, sick leave, etc. in the Labor area; (2) reports, correspondence, and forms in Printing & Duplicating; and (4) ofrice space, telephones, general supplies, etc. in Other. These costs are allocated in Column I to all other product classes in proportion to the direct costs in Column H. This is usually accomplished by dividing the Column H entry for Management and General (in the example, $135,000) by the sum of the Column H entries for all other product classes (in the example, $500,000-$135,000 = $365,000) to obtain a percentage factor which is then applied to each product class entry to determine the amount charged to that product. The negative entry on the Management and General line in Column I zeroes out both the line and the column.

Systems Maintenance is essentially the cost of the programming staff retained to enhance the system, develop new products, etc. This, of course, is not subject to unit costing. Computer Operations on the other hand, is the cost of running the system. It is not the cost of Computer Operators which is included in the Computer Services costs. Perhaps a more descriptive identification would be Computer Interface, since this is the

activity involved in preparing job & JCL cards, delivering input, collecting output, maintaining inventories, monitoring protection procedures, etc. Since there is no possible way to charge the effort on a product-by-product basis, it is allocated to other products on the basis of the Computer Services costs (Column E), by the same technique used for Management and Generai. Again, a negative entry (inColumn J) on this line zeroes out both the line and the column.

b. Support

This group of products is a series of three pairs. In each pair, the first product represents a segment of the activity which is not volume sensitive, that is, it is not materially affected by changes in volume. The second line of the pair is the segment which is volume sensitive. The purpose of this separation is to distinguish between the unit cost as experienced and the change in cost from changes in volume. Let's take the first pair, Reference General and Reference Request Processing, as an example. Costs are incurred for Reference Request Processing in almost direct proportion to the volume of requests handled. On the other hand, in order to process these requests, it is necessary to have and maintain a reference library. This maintenance cost is relatively stable, continuing at a constant level (within limits) regardless of the volume of requests. By collecting these costs separately, we are in a better position to assess the impact of changes in volume or procedures on the Reference Request Processing costs. However, in keeping with the philosophy of reflecting all the costs, the Reference General costs are transferred to Reference Request Processing in Column K and a unit cost is entered at this point to become part of the overall unit cost. The authority files (Thesaurus and Source Directory) are treated similarly.

c. Inputs

The first product in this group is somewhat at odds with later discussions. Normally, one would expect that Acquisitions costs would be incorporated, or at least transferred or allocated to the primary input products. However, at the time this form was produced, the acquisitions effort at the ERIC Facility was in its formative stages and it was felt necessary to get a feel for the program as a separate entity for some time before attempting to reflect it in the unit costs.

The next three lines in this group represent the major input of the Facility divided into Report Resumes, Regular (edited only) and Report Resumes, Full Processing (cataloged, abstracted, and indexed), with a Total line. This total is the total costs of the two segments and the unit cost is determined by dividing these by the total production. There are several readily apparent anomalies in this set of products. Since, in the computer operations, the fully processed items are inextricably mixed with the rest of production, no computer costs are recorded on that line. At the same time, the Computer Services unit cost for the regular production is inflated by the inclusion of these costs. The result is far from satisfactory, but full processing is also a relatively new effort, and we are still seeking a better display.

Journal Article Processing is the preparation of entries for Current Index to Journals in Education published by CCM Information Corporation with support from the Office of Education. The Facility only prepares the resumes. Data preparation, computer update, and publication are the responsibility of CCM. A point of interest here is that acquisitions cost--that is, the journal subscriptions--are included for this input.

The Acquisitions Data to File product is not connected with the Acquisitions Program above, but covers the entry into a subsystem of records of acquisitions by the various ERIC Clearinghouses. A publication produced from this file is used by them to minimize duplication of coverage.

d. Outputs

This group, in general, represents the "saleable" products from which a commercial system would have to derive its income. The first product, Linotron Tapes, collects the costs for the major, formal publications from the system. These publications are produced and distributed by the Government Printing Office, so our output to them is a magnetic tape of the information to be published, formatted to drive GPO's Master Typography Program. The next product consists of copies of the Master Data Set or parts of it supplied to various organizations as directed by OE. In either case, the only valid measure is the number of tape reels.

The next three entries represent the production of camera-ready publication pages, exclusive of the printing of multiple copies. The distinction is based, of course, on the method of production.

Pages Reproduced represents the cost of reproduction, binding, and delivery of all publications produced by the Facility. Note that the unit is thousands of pages, not pages. This is simply a matter of convenience to keep the unit costs manageable numbers.

The final product in this group collects the costs for preparing processed documents for delivery to the ERIC Document Reproduction Service which prepares and distributes microfiche under a separate contract.

e. Specials

This group is used to collect the costs of various ad hoc tasks assigned by the customer which, individually, are neither large enough nor of long enough duration to warrant permanent continued recording. Our usual practice is to show a separate line entry whenever costs are recorded during the period, but group completed tasks under a common heading. This provides the required detail without cluttering up the report unnecessarily.

This report is obviously only the tip of the iceberg, a brief summary of a great deal of detail which lies below. Let's take a look at the product structure which lies beneath the surface.

D. Product Structure

While no specific collection of products can be applied to all information systems, the pattern we have used seems to have sufficient flexibility to permit broad application, since it provides for collecting costs in as much detail as is likely to be needed with ready summarization into a manageable number of classes. The report we have been discussing (Appendix G, pag 1), for example, summarizes on 24 lines costs collected under over 400 different product numbers. This is accomplished by the selection of the labels for identifying the products and making use of the computer's summarization capability.

1. Label Selection

The essence of the pattern is the use of an alphabetic initial character to provide for collection of a relatively large number of individual products without an excessive number of digits. This permits assignment of up to 2000 individual products with a three-character code, which is just double the number available in all numeric. Only twenty alphabetic characters are used because the remainder (I,O,Q,V,X, and Z) are too easily confused with other characters or numbers. The alphabetic characters also provide mnemonic assistance to personnel recording the numbers and easy segregation of product numbers from other tags such as function or account.

2. Examples

A portion of the product list for the ERIC Facility is reproduced in Appendix H. Page 1 is a summary of the schedules, each a class of products which will appear in the Unit Cost Report. Assignment of products to classes which provide mnemonic assistance is concentrated in the heavily labor oriented areas with a number of different detail products and a number of different people charging to them, as in Schedule J for Journal Article input and Schedule R for Report Resume input.

Examining Schedule R (Appendix H, page 7), we find that the three lines on the Unit Cost Report are summaries of 25 different products. Each class of input (Regular and Full Processing) is represented by a group of twelve product numbers, one for each issue of the announcement journal. The last product, R99, is used as a collector for activities and charges which cannot be assigned to a specific issue. With this detail,

we can, if we wish, determine the input costs on an issue-by-issue basis for statistical analysis or for measuring the impact of changes or variations in size. This technique is not limited, however, to publication cycles. If there were enough effort in Request Processing, for example, to warrant it, we could assign a different number for each accounting period, and again subject the individual figures to statistical or cost analysis. In either case, the general number (x99) would be allocated to the different issues or periods on the basis of, perhaps, total direct costs, or production volumes,

Turning to Schedule M, we find a situation which almost requires extraordinary amount of detail. The Pages Reproduced line on the Unit Cost Report is, of necessity, a gross average. In point of fact, each issue of a publication has a different number of pages from the last, and different print runs are required for each publication, ranging from as few as four to well over 100. To obtain an accurate measure of costs, each issue of each publication must be separately costed. On the other hand, a periodic report displaying all of these individually would be both burdensome to prepare and confusing to read.

Even in areas which are not subject to unit costing, the availability of such detail can be useful. For example, Schedule B (page 2) provides not only for general maintenance activities and operations costs, but has ample room for collecting costs on major assignments as they occur.

E. The Role of Functions

Up to this point, we have almost ignored the function tag which was emphasized in Section II, but this tag can play an important role for the manager. Appendix J includes a functional unit cost report for the ERIC Facility and excerpts from a similar report prepared for NASA. The ERIC report covers only the major costs, but could readily be expanded to display other functional breakdowns as necessary. The NASA report is much more extensive, and displays "loaded" labor costs rather than simply the direct costs. Either permits assessment of where the labor dollars are going, and comparisons from report to report can be used to keep variations from getting out of hand. Note that the NASA report on STAR Journals (page 3) uses the function Abstracting to segregate items which have to be abstracted from the "regular" input, with the "actual" abstracting costs displayed as a footnote. With this information, it can readily be calculated that while the "average" document costs $10.006 to enter into the system, a Facility abstracted document costs $12.800, while an Author abstracted document costs only $8.673.

If Full Processing were not a relatively new procedure in the ERIC Facility and one which the customer wishes to monitor closely, the complications of two sets of product numbers could be eliminated by simply using the function "Document Analysis" with the regular product numbers.

Even in areas where unit costing is not applied, functional analysis is useful, as for example, in the General Costs analysis (page 5).

F. Production Counts

One of the most neglected factors in reporting costs of information systems is the production volume, and yet, one has only to consider the matter to realize that errors in production counts will have at least as much effect as errors in cost recording. In fact, a few moments with a calculator will show that variations in production counts can have an even greater impact than corresponding variations in cost. Therefore, particular attention should be paid to obtaining and documenting accurate production counts.

1. What to Count

The obvious minimum number of counts is the products which are to be unit costed in the report. However, this only scratches the surface. A glance at the ERIC Facility Weekly Report of Operations (Appendix K, pages 1 and 2), shows that there are a great many more count points than the 14 products on the Unit Cost Report. Any activity which may require unit costing, either for reporting or internal management purposes, should be counted regularly. How many, and which products to count--and in what detail--will be specific to a particular system at a particular time. However, a few cautions are in order.

a. Moderation - While it is a truism that production statistics can seldom, if ever, be reconstructed accurately if they are not recorded on a day-to-day basis, collecting every possible count just because it might be useful at some vague point in the future is neither practical nor economical. Select the counts which will tell you something which you need to know about the system.

b. Update - The Production counts should be re-examined periodically to insure that the counts being performed meet current needs. The more extensive the statistical reporting, the more frequent the re-examination should be.

However, you will find that it is far easier to add a new count than delete an old one. If you are not very careful, it will rapidly get out of hand. Pages 3 and 4 of Appendix K are the table of contents of the NASA monthly statistical report, and page 5 is a group of examples. This represents the reporting requirements after

strenuous efforts to reduce it. This also is in addition to a daily report similar to the ERIC report on pages 1 and 2. If a count is dropped, make sure that the person(s) doing the counting are informed and that they stop counting. Otherwise, you may encounter a situation like one we experienced, where a group was duly counting and filing reports two years after the need for the count had disappeared.

c. Consistency - To insure meaningful numbers, provide everyone with explicit, written instructions, preferably accompanying a form which is to be filled in on a regular basis. Assign specific responsibility for each count, and see that the count is made on schedule.

2. Where to Count

For deliverable products, the count point should be the point of actual delivery to the customer (or, in the case of inputs, actual addition to the file). Any count in advance of this is likely to become what should be delivered, not what is. In passing, it might be well to note that delivery of camera-ready copy for a publication which is printed internally does not occur until the publication is delivered, so that delivery requires two counts.

For intermediate and internal counts, the count point should be a transfer point, and the count should be verified by both the transmitter and the recipient. Otherwise, there are bound to be discrepancies which will plague whoever is trying to balance the entries.

3. How to Count

By machine, if at all possible. This is not from any anti-human bias, but simply that machines are generally more consistent, and, correct or not, more believable. Plus, of course, data in machine readable form can be manipulated, verified, and output with less effort.

By calculation, if the numbers are large. For example, Pages Reproduced at the ERIC Facility is counted by multiplying the highest page number (all publications are sequentially paginated) by the number of copies specified in the print order. Covers

and front matter are absorbed and overruns are ignored. Similarly, Accessions to File are determined by subtracting and lowest accession number in an issue from the highest, and adding one (Accession numbers are computer assigned).

By Physical Count, when there is no other choice, and then, very carefully, preferably with some means of verification.

4. When to Count

For machine and calculated counts, when the information is available. For items which must be physically counted, the counts should be on a day-to-day, or even hour-by-hour basis as they arrive at/or leave the delivery point. Frequent counts of small numbers are more accurate than more widely separated counts of large numbers, and adding machines (absolutely essential) can insure that the totals are accurate.

5. Production Reports

Production reports should be highly formatted and as easy to complete and read as circumstances permit. The format of pages 1 and 2 of Appendix K has been found quite flexible, and, by the simple expedient of changing the column headings, adaptable to daily, weekly, monthly, and multi-year reports.

The backlog figures which are provided for in most entries serve a multiple purpose. In addition to providing a means of checking the counts (e.g. a negative backlog means somebody miscounted), they provide a manager with a quick view of the status of the operation, and can warn of impending trouble.

G. Non-Production Costs

In our discussion of the ERIC Facility Unit Cost Report (Appendix G, Page 1), we touched on several classes of costs which are not directly relatable to production of products. These costs (System Development, Burdens, and Special Tasks) will not appear on a process flow chart, but it is necessary that they be included in the collected and reported costs.

1. Systems Development

The treatment of System Development will have a significant impact on unit costs. In a government-supported situation, System Development may be (and usually is) treated simply as a line item of cost which carries its share of any burdens (See b. below). However, in a commercial system, which must support itself by charges for its outputs, System development must be reflected in unit costs -- becoming, in effect, another burden. System Development almost invariably has two facets:

a. Revolutionary Development - This is the concerted effort to develop and implement an essentially new system -- the sort of effort that occurs at start-up; when converting from a manual system to a computer system; or moving from one generation of computer to another. Since it usually entails large expenditures over a relatively short time-span in order to reap benefits over a much larger span, that kind of development should probably be capitalized and after implementation, amortized against product costs over the expected life of the system. It is suggested that the anticipated life of the system be estimated quite conservatively, probably not more than five years.

b. Evolutionary Development - This is normally an essentially continuous series of relatively small changes, modifications or additions to an existing system. Since this effort is usually accomplished by a fixed, on-board staff on an "as time is available" basis, these costs should be allocated to product costs as they occur.

2. Burdens

Burdens are the most difficult segment of cost to deal with, and are probably responsible for much of the confusion about the true costs of information systems. There are four fairly universal classes of burdens, with the System Development discussed above frequently being a fifth.

a. Fringe Costs - These are the costs for employees over and above the salaries paid for actual work. Included in these are: Vacation, Holiday and Sick Leave Pay; Payroll taxes (the employer's contribution to FICA and Federal and State Unemployment funds); Workman's Compensation Insurance; and, where applicable, such things as pension plans, hospitalization, life insurance, etc. These costs will vary from 15% to 25% of the direct payroll, depending upon the organization's policies.

b. Facilities Costs - These are the costs for: office space; heat, power, and telephone; furniture; equipment; fixtures; etc.

c. Service Costs - These generally include such activities as: Accounting; Purchasing; Personnel; Maintenance, etc. In large organizations, interoffice messenger services; stock rooms; security offices; mailrooms; and office duplicating may also be included.

d. Management Costs - Generally recognized in this category are corporate (or institutional) planning and management, marketing, proposal preparation, etc. However, in the milieu of an information center, particularly one which is attempting to determine unit costs, there is an internal management burden representing at least the Manager and his immediate staff. Since these costs cannot possibly be charged with any accuracy or consistency to individual products, they must be allocated on some rational basis.

The difficulties in dealing with burdens arise from two facts. In the first place, while the definitions above are generally accepted, they are by no means universally applied. As mentioned earlier, some organizations treat various elements as direct costs rather than burdens. Secondly, even when the definitions of burdens are common, the methods of application vary widely.

A good many organizations simply lump all burdens together and distribute them across projects and products on the basis of the Direct Labor dollars charged. While this has the virtue of simplicity, it has many drawbacks, principal among which is the tendency to overload heavily labor oriented products, such as Document Analysis and unrealistically favor products with high equipment or floor space costs and relatively little labor, such as document storage and supply. At the other extreme, is the approach of allocating each type of burden according to its usage in producing each product. Aside from the extraordinary complications this introduces into recording costs, it is almost certain to introduce distortions in a multi-product system.

A more rational approach which is frequently used is to distribute only labor-related costs (basically, fringe) on the basis of Direct Labor, and distribute everything else on the basis of Total Direct Costs.

3. Special Tasks

This is a catchall for the myriad odds and ends which are an almost invariable concomitant of operating an information system. The most frequent way of handling these seems to be to absorb them in a burden or into management costs. This is not a good practice for two reasons. First, it unnecessarily inflates these costs with resultant increases in unit costs. Secondly, the costs of the individual efforts are likely to get lost. Since these special efforts are frequently precursors of regular workloads to come, it is prudent to record these costs as a base for future cost estimates.

It is recommended that a separate schedule be established for unforeseen workloads to permit individual treatment while they are in progress with summary treatment thereafter.

H. Allocations

Frequent passing mention has been made of costs which should be allocated. It would be well at this point to examine this procedure in some detail. Allocation is the process of assigning to each of a number of products a proportionate share of a cost (or group of costs) which was incurred in support of the group as a whole. The most common examples of this procedure are overhead and G&A costs which are commonly stated and applied as percentages of another cost element or subtotal.

1. Bases for Allocations

Since allocation is inherently an arbitrary procedure, virtually any base can be used -- from the square feet of floor space devoted to a product to the number of blue-eyed blondes on the staff. In information systems, however, allocation bases are generally limited to either cost elements (or subtotals) or production volumes. The choice between these (or among cost elements) should be based on achieving the most equitable distribution of the allocated cost.

In the ERIC Facility Unit Cost Report, the Management and General cost is allocated on the basis of the Subtotal, Direct Costs (as discussed in Sections C and G). In the NASA reports, the Management Allocation (or later, Nonproduct Direct) was allocated on the basis of Direct Labor because the customer so specified. Similarly, in the ERIC Report, Computer Operations is allocated on the basis of Computer Services costs, but in an earlier day, before multi-programming and complex algorithmic costing, this might have been on the basis of computer time used.

On the other hand, using Subtotal, Direct Costs or Direct Labor as the basis for allocating either Acquisitions or Input costs between Report Resumes, Regular and Full Processing would unrealistically favor Regular resumes at the expense of the already more expensive Full Processing resumes. In either of these cases, production volume would be a more realistic allocation base. Care should be taken, however, to use the right production base. If, for example, Descriptors to File were being allocated to Resumes to File, the basis for allocation is Resumes to File, NOT Descriptors to File.

2. Methods of Allocation

The most common method of allocation is to divide the cost being allocated by the base selected to obtain a factor, and then applying this factor to the portion of the allocation base associated with each product. In the ERIC Report, for example, the Management Allocation factor is: $135,000/($500,000 - $135,000) = .369863013. Multiplying the Subtotal, Direct Costs figure for each product by this factor will, if done correctly, distribute the $135,000 proportionately among the other products. Similarly, if Acquisitions costs were to be allocated to the Report Resumes products on the basis of production, the factor would be: $34,000/20,000 = $1.7000. Note that this is really a unit cost rather than a factor. Nevertheless, $1.7000 x 15,000 = $25,500 and $1.7000 x 5,000 = $8,500. $25,500 plus $8,500 = $34,000. So the result is the same.

3. Cautions

Whenever a cost is allocated in a report, it is necessary that the allocation be balanced by a negative entry (See the ERIC Report, Appendix G, page 1).

When several allocations are made in sequence, any cost being allocated must include costs previously allocated to it. In the Acquisitions example above, for instance, the Management Allocation to Acquisitions was included in the cost being allocated. If this is not done, the report will not balance.

Before applying an allocation factor to the individual entries, apply it to the base to verify that the toal will equal the cost being allocated, e.g. .369863013 x $365,000 = $135,000, or $1.7000 x 20,000 = $34,000. Incidentally, the larger the number of significant digits used in a factor, the more likely it is to come out even. In the above example, using .37 introduces an error of $50 and even .3699 introduces an error of $13.50.

I. Identifying Product Lines

With principles, documentation, results and techniques established, we can return to our Materials Balance chart and begin actual cost system design with the identification of product lines.

1. Categorization

Each functional block on the diagram should be identified as to its category (See Part II, Section B) to minimize inadvertent cross-over.

2. End Product Identification

Within each appropriate category, the end products must be identified, and the following questions answered:

a. What is the unit of measure? Is this a valid measure of the effort? Is it a coherent measure? That is, are all of the units essentially homogeneous, or should there be a finer breakdown? Does the selected unit provide for flexibility?

b. Where will it be counted? How will it be counted? Is the count easy to make, verifiable? Can it be counted by computer? Is it a true count? That is, a count of what is actually "delivered" rather than what should have been?

3. Intermediate Product Identification

For each end product identified in 2 above, trace back the process flow, identifying intermediate products and count points. The questions of 2.a and 2.b above should be asked for each intermediate product. Generally, intermediate products should be measurable by the same unit as the end product. When they are not, one of the following situations may exist:

a. Branch/Junction - An example of this situation is the distinction between Author Abstracts and Facility Abstracts in Apendix F, Page 1. The prior activities and the end result are the same, but the processing in this step is different. Consider the use of function to distinguish the costs and maintain separate counts.

b. Branch Only - Several distinct end products may be branches of a prior flow wherein they are indistinguishable. An example of this occurs in the chart in Appendix F, Page 1 at the accessioning block. Subsequent to this point, each accession series is a distinct, traceable product, but in the earlier flow, they are part of an essentially homogeneous stream. The root product should be identified as a separate product and unit costed for the purposes of control. This would then become an added cost to each of the end products branching from it. The allocation of this cost to the branches is discussed earlier under Allocations (Section H).

c. Contributory Products - Products which contribute to the production of end products, but are not measurable by the same units may be contributory products. There are two kinds of these -- countable and non-countable.

(1) Countable Contributory Products - These are contributory products which have a valid unit measure other than that applicable to the end products. The maintenance of an authority list such as a Thesaurus or a Corporate Source List would be an example of this type of product. The number of entries to the authority file is a valid measure of this effort, but has no direct relationship to the primary input. These should, of course, be separately identified and unit costed. In cases where the authority file becomes a publication which is a source of income, it may be desirable to consider these as end products in themselves, or the costs may be allocated.

(2) Noncountable Contributory Products - These are contributory products for which there is no valid unit measure. An example of this kind of activity would be the Acquisitions function. The temporal separation between effort and results, as well as the frequently disproportionate return for a given effort, render any unit cost figures for this activity meaningless. Costs should be collected separately and allocated.

d. Double Counts - Situations will occur where there are two (or possibly more) valid unit measures for the same activity. On the Materials Balance Chart (Appendix F, page 1) there are at least two examples: Keypunching, for which both Accessions and Cards are valid measures; and Document Reproduction, for which both documents and pages

are valid measures. Where feasible, consideration should be given to collecting both sets of counts and calculating unit costs against both measures.

e. Nonproductive Activities

(1) Correction Cycles - Correction cycles have a significant impact on both process flow and unit costs. For the purpose of management control, consideration should be given to collecting these costs and statistics separately, provided this can be done without unduly complicating the cost structure. However, the cost of corrections must be included in the overall cost of each end product. It should be noted that the significant number is not the cost of each correction, but the correction cost per delivered unit. Even if individual correction costs are quite high, if the end product volume is high and the number of corrections is very small, the impact on unit costs may be negligible.

(2) Nonbillable Outputs - These are best described by example. In the Materials Balance Chart (Appendix F, Page 1), output counts for the Request Processing cycle include Rejects and Form Letters. In neither case did the requester receive what he asked for. Since this was a service facility operation of the Federal Government, these outputs were a valid measure of productivity and were considered billable (to the Government). However, in a commercial environment where income would be dependent upon providing an output product, these outputs would produce no income. Therefore, while these units could (and should) be used in determining internal productivity, they could not be used in calculating unit costs for the purpose of pricing, although the costs, of course, would be included. Similarly, the unit costs of publications should reflect only those units which are expected to be sold, excluding units for internal use, review copies, etc.

J. Tagging cost Elements

With the product lines identified, the next step is to tag the various elements of cost so the information can be recorded and retrieved to produce the needed reports. At first glance, it would seem a fairly simple task. Simply assign each end product a collector prefix (e.g. R for Report Resumes to File) and give each step of production a number under that prefix (e.g. R01 for Receiving, R02 for duplicate checking, etc.). This will certainly get you a report, and, in fact, this is essentially the way it was done at the NASA Facility in later years (see Appendix F, pages 3 and 5). However, such simplification costs a great deal in terms of information not available for analysis. The costs from one period to another run together in the reports, and it is difficult to relate costs to production except over long periods, so the base for statistical analysis disappears. There is also a loss of control since it becomes extremely difficult to track changes or identify anomalies. The NASA Facility, you will remember, coped with this by designing an entirely new cost and work-in-process inventory system to avoid this loss of control. Few activities can afford this kind of investment or running expense. A more economical and -- for most organizations -- more useful approach is to make maximum use of the other kinds of tags besides product numbers, namely, Account, Function, Organization, and Project. Very modest numbers of tags in each class can provide a staggering level of detail without becoming burdensome. The product numbers can then be used to collect costs by period or issue (e.g. R01 through R12 for January through December). General recommendations for use of the various kinds of tags are discussed in the paragraphs below. However, it should be understood that we cannot possibly tell you in any detail how to design a cost system. We have one day, not a month. About all we can accomplish in the limited time we have available is establish some basic principles and try to indicate some approaches we have found useful.

It is suggested that the assigning of tags to cost elements be accomplished on a copy of the Materials Balance or Process Flow Chart. Each block on the chart can then be examined to determine what kinds of costs will be generated by each activity, to insure that everything is covered and that the cost collection system can handle all ele-

ments and provide the necessary discrimination. Additional blocks for Nonproduction Costs (e.g. Burdens, System Development, etc.) should be sketched in to provide a place to locate these costs.

1. Product Numbers

Product numbers should be used to identify product lines, rather than individual operations. Additional detail in product numbers has been found most useful in separating costs into manageable chunks by issue of a publication or by time period. If this approach is used, it is usually necessary to provide a general number to collect costs which can not be identified with a single issue or time period (e.g. the x99 products in the ERIC product schedules). Such charges might be annual subscriptions or forms printing costs. Note that where there is a branch or junction in the process flow, it is usually necessary to pick up a new product class designation. The exception is where a process flow branches and rejoins itself into a single process flow again (e.g. Facility Abstracts and Author Abstracts). The product definitions in Appendix B and the ERIC Product class list in Appendix H provide guides to assigning product numbers.

2. Function

In a branch/junction situation, the most effective method of segregation is the use of function. In the example cited, these might be Document Abstracting and Abstract Editing. However, this is not the only use to which function designators can be put. In every operation there will be a certain amount of clerical work, for example. If this is distinguished by a separate function, one can assess the amount of time required for clerical activities and determine whether or not the addition of a clerk to the staff would improve the productivity of the professionals enough to justify the cost. A reporting function would provide information useful in determining the costs of the reports. The list is endless. However, the list of functions should not be. Avoid making unnecessarily fine distinctions, particularly if the distinction can be inferred from product or organization. It is unnecessary, for example, to make a functional distinction between the Director's secretary and a file clerk in the input station. Both organiza-

tion and product charges will adequately make this distinction.

3. Organization

The usefulness of organizational discriminators will depend upon both the size and structure of an organization. In an operation as large as the NASA Facility, its usefulness is patent, while in a small, relatively independent operation like the ERIC Facility, it is of minimum utility. On the other hand, an operation may be small, but if it is part of a larger organization and obtains substantial support from other groups in the organization, the organization number will be useful in validating costs and determining the extent of each organization's contribution. Organization coding is discussed here because -- to the extent possible -- the organization should be structured as a part of the operating/cost system design to insure its compatibility with both. The choice among functional structure, product line structure, or a combination will have to be made in light of the particular situation.

4. Project

Project numbers should be reserved for distinguishing large blocks of activity such as two or more different contracts, or commercial operations being piggy-backed on a contract operation. In a large operation, they might be applied as category identifiers, but this application should be approached with caution, since the accounting system may have difficulty summarizing at this level.

5. Account

The account structure, because it will determine the level of detail available for the columns of the unit cost report, is more important than is often recognized. The level of detail needed for an information system may frequently be greater than that needed for corporate books. If so, additional detail should be added if possible. However, the addition of detail for the sake of detail should be avoided. While the list for the ERIC Facility (Appendix C, page 3) may be slightly too abbreviated, the NASA Facility list (Appendix C, pages 1 & 2) is far more detailed than most organizations are likely to need. Accounts, of course, distinguish among the various kinds of costs -- labor, materials, etc.

K. Dummies and Trial Runs

Once you have all the elements tagged, you have to "get it all together".

1. Tabulations

The first step is to collect all your assigned product, function, etc. numbers into lists and schedules similar to Appendices C,D,E, and H, and examine them for completeness of coverage. Is everything there? Has everything on the chart been accounted for? Has everything which has to be done been accounted for on the chart? Are the sequences susceptible to easy summarization? Make whatever changes are necessary to make all of these answers "yes".

2. Records Load

One of the things to be avoided is the overloading of one organization with counts and record keeping at the expense of another, but even disregarding that, people cannot be expected to keep track of volume and time spent like a computer. If the pieces are too small, you aren't going to get accurate records. To minimize this, collect the product/function numbers by organization, and examine the work records required for an individual in each organization during a typical day. If there are more than three or four, something is wrong. At this point, you have to examine the structure of the tags, the organization, the workflow planned, etc. and determine whether or not changes in one or more can and should be made, or whether you have to provide assistance in recording and keeping the numbers straight. Some of these problems are discussed at greater length in Part IV, Implementation.

3. Report Dummies

Before you progress much further, you had better prepare drafts of all the reports you are going to need to insure that they can be produced from the information you are collecting.

a. Unit Cost Reports

Can the individual items be summarized at the appropriate level for the customer/top management report? Can detail costs be readily extracted for statistical

analyses, cost benefit studies, assessment of procedural changes, and monitoring productivity? Are all costs covered? Have you provided for everything that has to be reported? Is there room to add the things you haven't thought of yet?

b. Production Reports

Are you counting everything that needs to be counted? Are the counts well-organized, i.e. can they be made and recorded readily, can they be easily verified, can backlogs be easily calculated? Can the most significant numbers be readily identified? Is any person or organization over-counting? Are all the numbers required for the unit cost reports represented?

c. Cost Reports

Will the cost reports (from your accounting system) provide subtotals at the level(s) of detail you will require for various reports? Do they provide current period and cumulative totals? Can bad charges be easily traced to the original transaction -- and corrected?

3. Trial Runs

If at all possible, it would be useful to generate dummy cost and production figures for a typical period, and run them through the complete reporting cycle -- production, cost, and unit cost reports to see what the results are. If the numbers used were the annual budgets, a useful reference tool for comparison with actual experience might be generated in this way.

IV. IMPLEMENTATION

The most elegantly designed cost collection and reporting system is not going to be worth a tinker's dam if it is designed without taking into account the problems of implementation or if it is implemented without careful advance planning and equally careful and thorough execution of the implementation plan. The problem, of course, is that you are ultimately going to be getting most of your input from people -- and people, unlike machines, are neither precise nor consistent. Nor are they quantitatively predictable, except -- maybe sometimes -- in very large groups. This means that both your information system and your cost system must be "human engineered" as much as possible. The ensuing paragraphs discuss some of the approaches to accomplishing this in terms of: system design parameters which should reflect human limitations; controls for detecting and correcting the errors which will inevitably occur; tools for educating and assisting the staff in doing their part; and last, but far from least, orientation of the staff before and during implementation.

A. Design Factors

If the system design is unrealistic in what is required of people in terms of remembering and recording information and tagging it, all the orientation you can design is not going to get you good information.

1. Work Requirements

If your processing and cost system are such that any employee is required to keep track of his time in five or ten minute increments, forget it. At best, what you will get is an educated guess which he will make -- if you are lucky -- at lunch or, more likely, quitting time. Obviously, if he is working on-line with a computer, you have the computer keep track of the time, but if he has to do it, you had better either cut down the detail or re-arrange the work flow to give him a couple of hours of the same kind of work at a time, and make sure the change is flagged for him when it comes. This last is particularly necessary when you have one or two major lines and are trying to keep track of several small ones, because your staff will tend to "ride the big ones". In one instance, several years ago, one shop had 97% of its work in two product lines which were on different time cycles with

very little overlap. The other 3% was in half-a-dozen special lines which were fit in whenever there was time available. At the end of the first period, the records showed that we had produced 1473 microfiche masters in one of these special lines without spending a dime for either materials or labor. This kind of situation will destroy the validity of your costs if it is allowed to persist.

2. Mnemonics

If your personnel are going to have to remember a lot of different product numbers and tags -- and they are -- , give them all the assistance in remembering that you can. Select alphabetic prefixes to coincide with the product name, e.g. Rxx for Report Resumes to File, Jxx for Journal Article Resumes to File, etc. Select the numbers to coincide with the issue number or month of issue or month in which the work is done, e.g. x01 for January, x12 for December, etc. The more heavily labor costs figure in the product line, the more important such aids can be.

3. Tag Discrimination

If you are tracking costs by five different tags (Project, Product, Function, Account and Organization) as recommended, don't, in the first place, expect your staff to record all five for each transaction correctly (See Tools, paragraph 3 below for suggestions). However, for everyone's convenience, try to make the tags distinct from each other so that they are readily recognizable. Such techniques as different numbers of digits plus the use of alphabetic characters or dedicated numbers can be used for this purpose. This kind of distinction is necessary for both human and machine checking of cost transactions. As a matter of fact, the use of alphabetic characters in product numbers was impelled not by the mnemonic assistance they would provide (you will note that the NASA product numbers are not mnemonic), but by the necessity for distinguishing them from functions. The year before the system we show here was implemented all of the tags except Organization were three-digit numbers (three of which were in series beginning with 100), and the employee had to record all of them on his time card. Since there were numerous cases of duplication of numbers, the results were -- at least for the purpose of determining unit costs -- garbage. The

immediate fix involved pre-printing everything except Product and Function on the time cards and using alphabetic characters in the first position of product number.

B. Controls

No matter what you do, there are going to be mistakes made, and controls will be needed to detect these mistakes as early as possible to minimize the cost of correction.

1. Machine Validation of Costs

The best control, at least from the point of view of consistency and assurance of catching everything, is a computer routine which takes a previously prepared table of valid combinations and compares all input to this table, rejecting everything that doesn't fit the table. A couple of cautions are in order:

a. Position

Be sure that the validity check occurs at the earliest possible point in the cycle, particularly if the accounting system uses Direct Labor transactions as a basis for generating other transactions. Otherwise, you may have to generate several corrections for a single error.

b. Flexibility

The validity table must be easily changed. Almost inevitably, as a result of oversight in preparing the original table or from changes in the system, you are going to have to change the table. If you use multiple numbers to track issues or accounting periods, it will have to be changed frequently.

c. Rejection

Rejected transactions should be listed (or better, punched) out in full detail so that you can determine the source of the error and easily enter the necessary correction.

2. Machine Counts of Production

As pointed out in Part III, Section F, production counts should be machine developed whenever this is possible, as the best way of insuring consistency.

3. Redundancy in Manual Counts

When manual counts are unavoidable, they should be double checked. Counts at transfer points within the system should be made independently by the transmitter and the recipient and the results compared and reconciled. If a manual count is required at a delivery point, there should be a permanent unit record of each delivery (a copy of the bill of lading, etc.) which can be independently counted.

4. Work-In-Process Checks

Production reports should include provision for displaying work-in-process (i.e. backlog) in each station where counts are made. Backlog at the beginning of the period, plus input, minus output, equals backlog at the end of the period. It is not necessary to inventory WIP at the end of every period to make this useful information. Obviously, if the backlog calculates out at a negative quantity (and this will happen), something is wrong with the counts. (Incidentally, backlog should not be calculated by the operating unit.) If, on the other hand, the backlog is growing rapidly, there is a production problem in that station. If it is dropping sharply, you may have a production problem in the previous station, and so on. If the layout of the production area is designed to make backlogs easily visible (i.e. all work units not completed and not being actively worked on in one spot), a visual check can verify at least the approximate accuracy of the reported backlogs.

5. Overview

Finally, at some point in the cycle before the reports are finalized, you must have an overview of the collected and partially summarized data by someone who understands thoroughly both the information system and the cost collection system. His job is to spot the anomalies which no computer can detect (at least, not without several years of data in a fairly stable situation to work on), and the inconsistencies which cannot be caught by piecemeal examination of individual transactions. A word of warning to potential cost system designers. The guy who designs the system usually winds up getting stuck with this job since he is presumed to know the most about both systems.

C. Tools

The usefulness and accuracy of your cost system will be in almost direct proportion to the quality and quantity of tools you provide your staff with to help them understand and execute your system.

1. Definitions and Lists

Lists similar to those in Appendices C,D,E, and H should be prepared and made available to at least all supervisors. Accompanying each list should be definitions of every number on the list. The product definitions in Appendix B are examples -- in terms of approach and level of detail, of not in content -- of how these should be written. Do not, however, make the mistake of giving everybody on the staff the entire package. You will scare them to death. Seriously, this could very well establish a negative set which would be difficult to overcome. Each unit should be given only those definitions and numbers which they are likely to be using. If sequential product numbers are used to track issues or periods, only the group need be defined in detail, with notation of how the sequence is to be used.

2. Validity Lists

Even with selective distribution of numbers and definitions, it will be necessary to provide instruction and reference material on how to use the various tags with each other. Validity lists fill this need. Page 1 of Appendix L is a unit validity list, showing the products which are expected to be used by this section and the functions which are valid in that section with each product. Pages 2 and 3 are a period validity list which shows specifically which products in each sequence are valid during the period. Both of these are useful in maintaining accuracy and consistency of cost recording. The period validity list would be improved by specific start-stop dates for each product when this is possible.

3. Input Forms

The design of the forms on which the employees record both their time and production counts can have a significant impact on the accuracy with which these numbers are reported.

a. Time Cards

Page 1 of Appendix M is a basic time card used by the parent organization, wherein the employee is expected to fill in Project, Product, Function, and Account as well as the hours worked each day, name, date, organization, etc. Now take a look at Page 2 of Appendix M. By the simple expedient of providing overprints and a single line of computer printing, the complexity -- and the probability of error -- have been reduced by at least an order of magnitude. Since the Direct Labor account is a constant, and the Project number a virtual constant for most employees, these are pre-printed. Blanks are left on the reverse for the occasional "odd job". The employee name, number, organization, date and week number are pre-entered by computer. This leaves only the product, function, and hours to be determined by the employee, and, since the product number begins with an alphabetic character, an inversion stands out to both visual and machine check.

b. Production Data Collection Forms

A common failing in planning for the collection of production figures is the assumption that blank copies of the final report (or parts of it) are the best form for recording production figures at work stations. This is not the case. In the first place, if the form is designed to be filled out on a typewriter, as in the case of the ERIC Weekly Report of Operations (Appendix K, pages 1 and 2), then most of the staff (who will not have typewriters) will have difficulty getting the numbers in the space provided. Secondly, there is no room for more frequent entry (i.e. several times a day as batches are received/forwarded). Finally, it may be more convenient and more accurate to have more detail in the station worksheet which will not appear on the final report, but will be available for retrospective analysis if it is needed later. Pages 3 through 6 of Appendix M are typical workstation sheets designed for use at the NASA Facility some years ago. Note that these are designed for manual entry of the numbers, contain more detail than would appear in the report (similar to the ERIC report mentioned above), provide for ready summarization to the level required for the report, and differ in format according to the work station. The extra effort devoted to custom designing such reports for each work station will be repaid several times over in reduced costs and prompter, more accurate figures.

4. Schedules

At first glance, it might seem that published schedules would be of little use in implementing a unit cost system, but the contrary is true. Aside from the fact that a properly designed and displayed schedule will help immeasurably in informing the staff of what is going on and when, it can help to keep them using the right numbers and counting the right things at the right time.

Development of schedules for an information system should start with straightforward Gantt-type charts similar to pages 1 and 2 of Appendix N. Gantt charting is preferred over PERT or Critical Path charting because it is better suited to the heavily overlapped sequential operations typical of information systems, and almost equally important, it is much easier for the novice to read and understand. Starting and ending points for each operation and the duration of each operation for a given issue are clearly displayed, as well as the necessary sequence of operations. Note that the three charts on page 2 each start from a specific point which is tied to the chart on page 1. Cumulative Index Production follows the Index Final (of the last issue in the cumulative) by one day. Microfiche Production starts one day after the Index Edit of the first batch is completed. SDI Announcements cannot be prepared until Abstract Photography is underway and the final phases are dependent upon the SDI Match which cannot occur until the day following the Index Final.

With the workday schedule finalized, translation to a calendar schedule is the next step. In a relatively small operation with a single major product, this can take the form of page 3 of Appendix N, with, in effect, a repetition of the Gantt chart. In a larger operation, with multiple publications and the necessity for adjusting schedules to avoid overloading the computer facility, the format of page 4 would probably be preferred. Both of these show workdays for the period by actual calendar date, with weekends omitted and holidays blanked out. Transferring the Gantt chart to either is simply a matter of counting the workdays available on the calendar to establish the actual calendar dates for each step. Since publication dates are usually the most readily established fixed points, it is the usual practice to identify these and work back from there.

Charts such as these can readily be translated into issue-by-issue schedules which give staff members (and the computer validation routines) operation-by-operation start

and stop dates and product number cut-offs to further minimize mischarging.

D. Orientation

There is no substitute for early, carefully planned, complete, and continuing orientation in enlisting the cooperation of your staff in implementing and executing the system you have designed.

1. Timing

The ideal time to begin orientation of your staff is when you begin designing the system. It is an all too common mistake among self-styled "experts" to ignore the very real, very substantial contributions which can be made by the guy who has been -- or is going to be -- doing the actual work. Get him into the act as soon as possible, and certainly no later than the first drafts of the forms he is going to have to fill out. To the extent possible, keep the staff informed of progress as the design is developed. And don't make the mistake of only showing each unit "their part" of the operation. At least expose the entire staff to the entire system -- in simplified form, if necessary, but all of it, so they will know at the very least where their contribution fits in. And don't be too surprised if an input clerk comes up with an idea that cuts costs or schedules at the other end of the process. That sort of thing has happened more than once. Incidentally, orientation should never stop. Whenever there are changes in either the system or personnel, the orientation should be continued or repeated.

2. Coverage

As a minimum, the orientation should cover:

+ What the system(s) is (are).
+ How it works.
+ Why it is done -- and Why it is done this way.
+ What their responsibilities are.
+ What the impact of errors is.
+ What the tools are and how to use them.
+ Who they can ask questions of and make suggestions to (See below)

3. Feedback

The surest way to minimize "installation pains" and maximize system effectiveness is to encourage and provide a minimum resistance path for feedback from the staff once the system is put into operation. No matter how careful the design and the orientation, there are going to be questions, problems with actually doing the work that nobody thought of, and insights into ways to improve things. It is best to have a single person thoroughly familiar with the system designated as a focal point. For the first few months, his primary responsibilities should be to: answer (or get answers to) any questions about the system and its operation; listen to and consider every complaint or suggestion (even the half-baked ones) about what is being done and how. Properly handled, these interactions can be used not only to improve the system, but to improve further the employees' understanding of and their attitude toward it. This last is no small gain. If the staff doesn't come to the coordinator, he should go to them, ask them how it is working, and check their record keeping -- particularly the professionals. Strangely enough, it is the professionals who will be the slowest to get into the habit of making frequent counts and time entries. Probably this is because it is seldom expected of them.

Feedback during the implementation period should be used to verify the distribution of the counting workload, make appropriate adjustments, and try to get an idea of how much all the record keeping is going to cost.

4. Documentation

An essential part of the orientation of the staff is a set of written instructions for each form that has to be completed, with examples of each. Written procedures for assembling all the interim reports as well as the final unit cost report should be prepared as well. If this is not done, turnover and transfers will gradually result in a deterioration in performance. However, be sure to keep the instructions updated on a current basis, or you will have even worse problems.

V. FORECASTING

Forecasting what is going to happen next year in an information system may be easier than predicting the stock market and more reliable than picking horses, but you won't get very good odds from anyone who has tried it. Actually, it doesn't have to be quite that bad. The production counts and unit costs which can be developed from a system such as we have been discussing can constitute an excellent data base for forecasting, PROVIDED you are in a relatively stable situation (including reasonable growth), and that you avoid the many pitfalls that are going to be in your path. Much of what follows will be indications of what not to do in forecasting, rather than how it should be done. This approach stems, in part, from recognition of the fact that there are many much better qualified sources of information about forecasting techniques. More important, however, is the knowledge that misunderstanding or misuse of the results can lead to disaster -- and frequently has.

A. Requirements for Forecasting

The first requirement for forecasting is data. If you don't have a substantial (and accurate) data base to work from, you aren't forecasting, you are guessing. Worse, if your data is insufficient or inaccurate, using it is likely to distort an otherwise educated guess in the wrong direction.

The second "commandment" is the other side of the coin. If you give your statistician raw historical data, no matter how accurate and extensive it may be and no matter how elegant his analysis, the "projections" you get from him are going to be pretty pictures of what happened last year and what might happen next year IF NOTHING CHANGES! Obviously, adjustments are going to have to be made.

1. Output Adjustments

On the surface, the easy way to make adjustments is in the completed projections from historical data. To take a case in point, a frequently used method of projecting costs is performing a least squares regression analysis of the costs for each period (or issue) against the number of units processed in the period (or for the issue). This analysis produces a straight line "average" which can be described by the formula:

$$F = Kn + kx$$

Where:

F = Total Cost

K = The period (or issue) cost

n = The number of periods (or issues)

k = The incremental cost per unit

x = The number of units

Unit costs for the period(s) covered are obtained simply by dividing the total cost by the number of units, as follows:

$$U = \frac{Kn + kx}{x}$$

However, for budgeting purposes, Total Cost (F) is the significant number. Pages 1 and 2 of Appendix P are work sheet graphs for cost projections using this technique. A straight line was derived for the plotted points and then both the issue constant and the incremental cost constant were increased to produce the line shown. The factors used to increase the constants were based on estimates of average increases in labor and burden costs. This is a convenient, but dangerous, way to adjust history to probable future performance. First, it is not much better than an educated guess. Second, it is far too gross an approach to be prudent.

2. Input Adjustments

A far more useful set of forecasts can be obtained if you take the trouble to adjust the figures before you give them to the statistician. At that time, you can examine the details for probable changes, instead of having to work with gross numbers. Here is where the Account breakdown of cost on your report becomes most useful. Using the ERIC Unit Cost Report (Appendix G, page 1) as an example, we can take a line (Report Resumes, ALL) and indicate how this might be done.

a. Direct Labor - How is this likely to change in the next year? What has been the historical rate of salary increases? Have they tracked the cost of living? Will you have to catch up? What impact will turnover have? Learning curve? Adjust labor cost appropriately.

b. Fringe - Will taxes (FICA, etc.) increase next year? Will insurance (Workmen's Compensation, etc.) rates decrease? Pension plan changes? Determine the most probable rate.

c. Data Preparation - Will the subcontractor maintain current prices or raise them? How much? Should you bring the operation in-house? This will change these costs to Direct Labor and Fringe and machine and material costs. Adjust as necessary.

d. Computer Services - Will costs go up or down? New system? New hardware? Check and make appropriate adjustments.

e. Printing & Duplication - How much forms printing will you need next year?

f. Other Direct - What are these costs? Equipment rental or maintenance? Supplies? Services? Will they recur next year? What else?

g. Allocations - Will either the allocated cost or the base change next year? How much? What impact on the rate? Note that a change in management structure can change that cost substantially, and similarly, any major change in total workload of the operation can affect the allocation significantly.

h. General & Administrative Costs - What will these be next year? If you are not responsible for these costs, get the budget from your organization comptroller. Then look at past budgets and actuals. How accurate has he been?

i. Fee (or profit) - What are you trying for next year? What do you expect to get? If commercial, are your prices competitive? Should you raise or lower them?

j. Volume - Now go back and look at this year's volume. Will next year be higher or lower? How much can it grow before you have to add personnel? When? Training time? Productivity? How far can it decline before you have to lay off someone? When? Who? Termination pay? Transfer? Where? How sure are you of the volume projections? Are they conservative? Optimistic? Look at the other elements of cost. What effect will forecast

volume changes have on them?

Note that while we are talking here about the summary line, the adjustments derived must be applied to the issue-by-issue or period-by-period costs. Don't forget the general (x99) cost (see paragraph D.2, page 19) which is buried in that summary line along with the individual issue costs. Make sure that each issue (or period) carries its share in its total cost.

Now give the adjusted costs to your statistician. When he gets through, you should have a fair picture of next year's unit costs -- barring unforeseen difficulties.

B. Cautions

Most organizations will have little difficulty in finding personnel and techniques for making forecasts. Where they are likely to get into difficulty is in assuming that the results are "gospel" and planning accordingly. The following paragraphs point out some of the limitations of any forecast.

1. Volume Projections

Volume projections based on past history assume that everything is going to continue according to the pattern established. This should always be taken with a grain of salt. Before relying on such projections, try to assess the validity of the assumption in the particular case. What is likely to happen which would change the pattern? In which direction? What are the consequences of a sharp increase or decrease? Before you brush aside these questions, take a look at pages 3 and 4 of Appendix P. Those are actual experience figures, but in both cases, the projections were prepared three to six months before the peak and gave no clue. These will be discussed in more detail later.

2. Range Limitations

The cost lines on pages 1 and 2 of Appendix P extend from zero production to to 150% of current experience. This is the customary practice, but don't believe it. The equation from which that line was drawn is valid only for a limited range on either side of current experience (i.e. the plotted original data points.) In the case of STAR, for example, cost projections from this line for average volumes less than 800 or greater than 1200 would be very imprudent. For that matter, even within those limits it may be risky if, on the high

side your staff was stretched to its limit, or on the low side if it is already a bit fat. Look at your overtime records and productivity figures to check this out before you accept the figures.

3. Quantum Steps

The cost line is straight, and the unit cost equation gives you a smooth curve, but in practice, it never works out that way. It is impossible to hire half a person or buy half a camera. As volume grows, your unit costs will decrease smoothly enough until you reach some critical point where you have to hire another person or buy another piece of equipment, or both. Then there is a quantum jump to a higher unit cost from which there will again be a gradual decrease as volume continues to grow. However, don't forget that there will be training costs and installation and debugging costs on the new equipment. More important, don't forget that you will still be paying a salary or paying for the equipment even if volume doesn't continue its growth or recedes.

4. Murphy's Law

"If anything can go wrong, it will." In this context, we are trying to say that no matter how carefully you develop your forecasts, no matter how cautiously you project future possibilities, unless you are infallibly prescient, occurrences beyond your control can blow the most carefully made plans. The graphs on pages 3 and 4 of Appendix P are clear illustrations of this. On page 3, the curve for Facility-Photographed Masters reflects the publication of the COSATI microfiche standard and the subsequent policy that documents would be photographed for microfiche only once. Unfortunately, the justification for an entirely new production line (installed in September 1965) was made on the basis of the data through Fiscal Year 1965. On page 4, the Microfiche Blowback curve reflects the removal of government controls on the price of silver (it was a silver process). Fortunately, the equipment was leased (although we had considered buying it the previous year), so the adjustment (conversion to xerographic reproduction whenever possible) was relatively painless.

None of the foregoing is intended to discourage forecasting. You have to do

it to stay in business and there is no question about the growth of the information business. Just be careful, and whenever possible, avoid closed-end decisions, i.e. don't "lock yourself in" with a particular process or piece of equipment if you can avoid it.

VI. Fringe Benefits

By this time, you have no doubt concluded that our initial warnings about the difficulty and expense of designing and installing a unit cost system such as we have described, were understated. Don't be discouraged from trying. If we have occasionally appeared to emphasize the negative aspects, it is only because experience has taught us that they exist and that they are frequently overlooked. On the other hand, however, the design and installation of a cost system in accordance with these guidelines will produce a number of fringe benefits which, taken together, will almost justify the cost themselves. To list just a few:

A. Knowledge of the System

By the time you have completed a Materials Balance Chart (Appendix F) and annotated it to develop your cost tags, everybody involved (and that should be most of your staff) will have a better understanding of the system than they could get from years of briefings and brochures. Bottlenecks will have been discovered and (hopefully) eliminated. Producing the schedules (Appendix N) will have a similar effect. Your system will probably work better, and so will your people.

B. Awareness of Cost

The process of developing and installing the system, as well as keeping the required records, will develop in your staff a consciousness of what things cost which can only redound to the benefit of the operation. If they are shown some of the reports with an explanation of peaks and valleys, this effect will be amplified.

C. Controls

The production reports with backlog and float (aging) displays provide an invaluable tool for managers and supervisors to spot potential problems before they become disasters. The validation routines will keep a lot of garbage out of your accounting system , and the detail available for analysis will permit accurate analysis of cost effectiveness.

D. Morale

If, as we strongly recommend, you enlist input from all -- or at least most -- of your staff in designing and implementing the system, you can count on better performance and

a unity of purpose among your people which is hard to come by. Nor will this be confined to the "indians". Your "chiefs" will benefit from a better understanding of the real world of the "indians".

Further, the demands of the system for frequent, regular, and accurate reporting with prompt feedback and response to anomalies will impose on everyone an objective discipline which can further improve both efficiency and morale. The employees will know they are being closely monitored, but because the numbers are impersonal, the monitoring will not chafe. There is an old navy saying that "A taut ship is a happy ship." This is based on everyone knowing his job, knowing where it fits into the whole, and knowing that error will be detected and corrected promptly. It works.

APPENDIX A

Typical Information System Building Blocks

APPENDIX A (DRAFT)

Typical Information System Building Blocks

Information Center	Conventional Library
A. INPUTS	A. INPUTS
1. Acquisitions Scanning, Selection, Requesting, Ordering, Records keeping	1. Acquisitions Scanning, Selection, Requesting, Ordering, Records keeping
2. Input Processing a. Receiving Sorting, Opening, Multiple copies, Routing	2. Input Processing a. Receiving Sorting, Opening, Multiple copies, Routing
b. Screening Selection for in scope, quality, reproducibility, type of processing	b. Serials Records Maintenance
c. Duplicate Checking	
d. Accessioning Number assignment, document preparation (marking, labels, etc.), logging	
3. Surrogation a. Descriptive Cataloging	3. Cataloging a. Main Entry Selection
b. Indexing Selection of Subject (headings, terms, etc.)	b. Cataloging & Call Number
c. Abstracting	c. Subject Heading Assignment
4. Authority File Maintenance a. Subject Authority	4. Authority File Maintenance a. Subject Authority
b. Source Authority	b. Author Authority
c. Author Authority	
d. Other	
5. Input Preparation Preparation of machine sensible record	5. Input Preparation Preparation of Master card/Duplication

APPENDIX A (DRAFT)

Typical Information System Building Blocks

Information Center	Conventional Library
A. INPUTS (CONTINUED)	A. INPUTS (CONTINUED)
6. File Update & Maintenance Additions, Changes, Kills, Purges	6. File Update & Maintenance Sort & file cards.
7. Pre-Processed Material Author Abstracts, Magnetic tapes, etc.	7. Pre-Processed Material LC Catalog card sets
B. OUTPUTS	B. OUTPUTS
1. File Copies Magnetic tape copies of file(s)	1. Book Catalogs a. Selection & Formatting
2. Publications a. Selection & Formatting For system feeding the GPO Master Typography Program, this may be the final step.	b. Copy Preparation (1) Chain Printer
b. Copy Preparation (1) Chain Printer Distinguish among: (a) Single copy (for further reproduction) and multi-part (no further reproduction)	(2) Computer-Onto-Microfilm (COM)
(b) Upper Case Only (Fast, but generally lower density) and Upper and Lower Case (Higher density achievable, but slower)	
(c) Differing formats - The extremes are straight 132 character line "dump" and a multi-column index with spacing, identation, and overstrikes.	
(2) Computer-Onto-Microfilm (COM)	

APPENDIX A (DRAFT)

Typical Information System Building Blocks

Information Center	Conventional Library
B. OUTPUTS (CONTINUED)	B. OUTPUTS (CONTINUED)
(3) Photocomposition	(3) Photocomposition
(4) Manual In information system, this is generally confined to covers and front matter	(4) Manual
c. Reproduction Major cost impact of number of copies General breakout: (1) Less than 25 copies - Office Duplicators (Xerox, etc.) (2) 25 to 2000 copies - Offset (3) 2000 to 5000 copies - Offset Letterpress (4) Greater than 5000 copies - Letterpress	c. Reproduction
3. Retrospective Searchs	
Batch Mode	Interactive Mode
a. Order Processing	a. Order Processing
b. Search Processing	b. Search Processing Essentially the same steps as batch mode, except not discrete, except final output
(1) Query Formulation	
(2) Input Form Preparation	
(3) Machine-sensible keying	
(4) Computer search/ Prelinimary Output	
(5) Screening	
(6) Final Output	
c. Feedback User relevance evaluation	c. Feedback

APPENDIX A (DRAFT)

Typical Information System Building Blocks

Information Center	Conventional Library
B. OUTPUTS (CONTINUED)	
4. Current Awareness	
a. Profile Preparation See Retrospective Searches	
b. Periodic Computer Runs Usually input for one issue or period	
c. Duplication/Assembly Depends on particular format & coverage	
d. Feedback Acquisition, Analysis, Profile Maintenance	
5. Packing/Shipping Must be reflected in all output costs	5. Packing/Shipping

Typical Information System Building Blocks

Information Center	Conventional Library
C. COLLATERAL SERVICES 1. Document Dissemination a. Automatic - Microforms Only (1) Document Preparation (2) Header/Resume Preparation Key or film strip (3) Master Preparation (a) Original Filming (b) Conversion (4) Duplicating Card-to-card, card-to-roll, roll-to-roll (5) Distribution/Assembly b. On Demand (1) Request Processing (a) Standard (By accession number on standard form) (b) Nonstandard (All other - title, author, not in file (Acquisition) (c) Forward to Fulfillment or Response (Referral, etc.) (d) Close/statistics	C. COLLATERAL SERVICES 1. Document Dissemination a. Circulation Desk

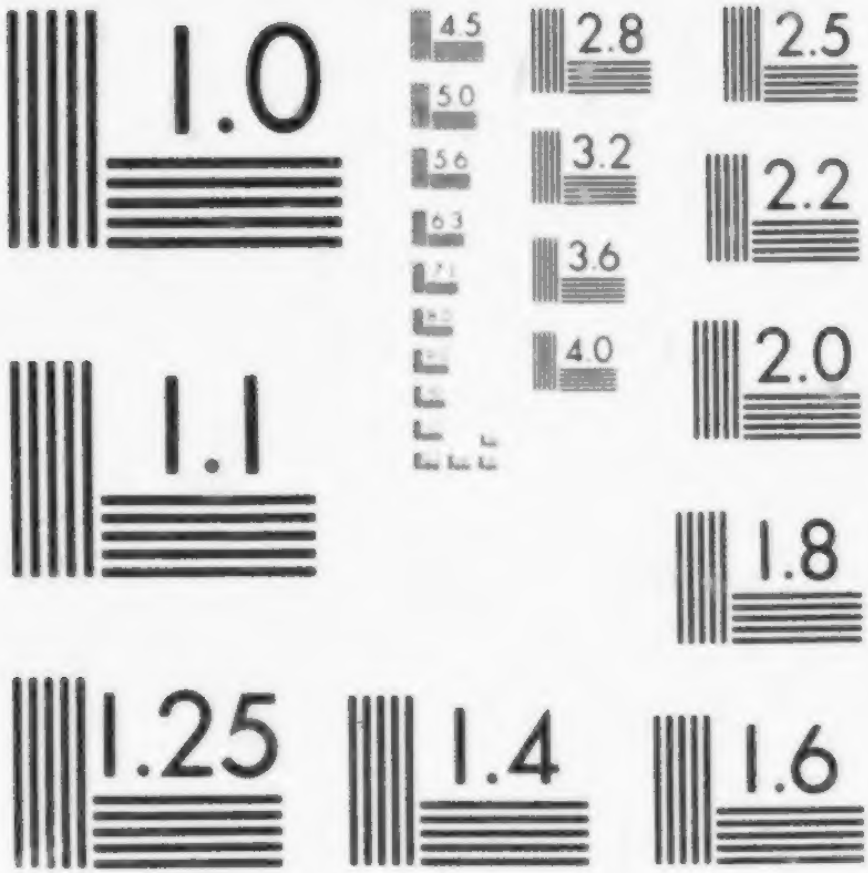
Typical Information System Building Blocks

Information Center	Conventional Library
C. COLLATERAL SERVICES (CONTINUED)	
(2) Request Fulfillment (a) Stock Available? Pre-stock? Warehouse costs? (b) Microform (c) Hard Copy Duplication i. Blowback from microform ii. Duplicate Case File, Costs, Warehousing, Pre-stocking?	
2. User Records Adds, Changes, Postings (services provided), Billings(?)	2. User Records
3. Software To search file copies, etc.	3. Interlibrary Loans
D. SPECIALS	D. SPECIALS
1. Reference Library (a) Specific information requests rather than document reference or copy. (b) Support to other activities, e.g. Acquisitions, Request Processing, etc. (c) Management support	1. Reference Desk Specific information requests rather than document reference or copy.
2. Ad Hoc Efforts Information Analysis, Studies, (state-of-the-art, etc.), One-shots.	

Typical Information System Building Blocks

Information Center	Conventional Library
E. BURDENS	E. BURDENS
1. Management Manager(s), secretarial, personnel, accounting, purchasing, occupancy, equipment, nonproductive time (vacation, holiday, sick, etc.), insurance, taxes, etc. Division of these among Direct, Overhead, and General & Administrative costs are not likely to be common to any two organizations. Frequently buried or overlooked.	1. Management Manager(s), secretarial, personnel, accounting, purchasing, occupancy, equipment, nonproductive time (vacation, holiday, sick, etc.), insurance, taxes, etc. Division of these among Direct, Overhead, and General & Administrative costs are not likely to be common to any two organizations. Frequently buried or overlooked.
2. System Development Major developments should probably be amortized over the anticipated life of the system. Evolutionary or level-of-effort activities can be allocated as incurred.	2. System Development Major developments should probably be amortized over the anticipated life of the system. Evolutionary or level-of-effort activities can be allocated as incurred.

67



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX B

Information System Product Definitions

PRODUCT DEFINITIONS

1. Accessions to File (Each) PROCESS FLOW #1
This product includes all activities necessary to receive and enter documents onto the basic Document Data File through and including updating and a proof/correction cycle. Includes duplicate checking, delivery to NASA Evaluator or to appropriate Facility component, issue assignment per Evaluator's instructions or other NASA designee, descriptive cataloging, indexing, journal categorizing and COSATI category assignment, keying for machine input, and update. Includes entry into the file of accessions in the series listed in the Table of Document Accessions except A10K and Specifications and Standards. Includes items prepared for machine entry for preparation of special bibliographies and items prepared for machine records only, but not otherwise entered into the system. The removal of accessions from the file (kills) will be included in the volume unless the removed item is a duplicate of a previously accessioned item and accessioned in error. No output products are included. Excludes abstracting, abstract editing, and document evaluation.

2. Abstracts Announced (Each) PROCESS FLOW #2
Includes the preparation of camera-ready copy for announcement journal pages in current formats. Includes writing and/or editing of abstracts where necessary. Includes keyboarding, machine entry, proofing, and correction. Includes page makeup of the abstract section of the journal. This proposal presumes continued receipt on a timely basis of DDC abstract data on compatible tape. Includes abstracts for STAR, CSTAR, Secret Supplement, RATR, and the Library of Congress items in the Aerospace Medicine Bibliography. Includes Contents Notes used in lieu of abstracts.

3. IAA Input (Per reel updated) PROCESS FLOW #3
Includes the entry into the Document Data File of data supplied in identical format on magnetic tape by AIAA.

4. Publications Pages
This includes all activities necessary for preparation of camera-ready copy of standard publications listed on the following Publications Table. Included where applicable are stripping data from the file, formatting, preparation of copy, overview, and required correction of substantive errors to conform the copy to the corrected Document Data File. Presumed in all cases are print densities and page sizes corresponding to current experience, and fonts currently available (see Specifications). Includes updating and minor corrections for covers, front matter, mastheads, etc.
   a. GRACE Index Pages (Each) PROCESS FLOW #4
      Includes the cost of stripping index data from the files, formatting and converting for GRACE input. This proposal presumes continued use of the of the GRACE equipment at no cost to the contractor. Excludes STAR and IAA index pages produced by computer printout.
   b. Computer-Produced Pages - Camera-Ready (Each) PROCESS FLOW #5
      Includes stripping, formatting, and listing on the computer printer, pages which will become camera-ready copy for subsequent reproduction either in the Facility or elsewhere. Includes computer-produced pages for STAR and IAA, (e.g., Accession Number Index), all indexes for CSTAR and continuing bibliographies, all body pages for SAB, PAR, Tech Brief Index, Management Issuances Index, etc. Includes camera-ready copy (but excludes reproduction) of Subject Authority List, Microfiche Check List, etc. Excludes SCAN output and Accession Card Printouts.

* NASA Scientific and Technical Information Facility - Process Flow Charts,
Douglas S. Price, Jost Gotschi, Documentation, Inc.
January 1968, 50pp.

   c. Computer-Produced Pages - Listings (Each) PROCESS FLOW #6
      Includes computer listings produced on single or multipart paper, not intended for subsequent reproduction. Includes all file print-outs and special listings produced at the request of STI or TU Divisions. Excludes proof listings and other internal listings required for internal operations only. Excludes SDI output.
   d. Other Composed Pages (Each) PROCESS FLOW #7
      Includes the preparation of camera-ready copy for the STAR and IAA portions of the Aerospace Medicine Bibliography. Excludes the Library of Congress (A80K) Section, and the indexes. Includes new and revised front matter for publications, but not recurring mechanicals. Includes CCM issues and Cumulative, Specifications and Standards (Section I and II), and composition of camera-ready copy for indexes to reports to Congress when required. Includes pages for continuing and special bibliographies not produced by computer printing. Excludes Tech Briefs and Abstract Cards.

5. Microfiche Masters
This includes all activities necessary to produce a microfiche reproducible copy conforming to the current COSATI standards as presently amended by NASA and suitable for use on the card-to-roll machines.
   a. Facility Origin Microfiche (Each) PROCESS FLOW #8
      Includes filming a full-sized document supplied. Including special microfiche such as Abstracts, Tech Briefs, Flash Sheets, News Releases.
   b. Non-Facility Origin Microfiche (Each) PROCESS FLOW #9
      Includes the addition of a NASA accession number, STAR subject category and microfiche distribution code, to a COSATI standard microfiche supplied. Production of intermediates for reproduction is included in cost of copies.

6. Microfiche Distribution Copies (Each) PROCESS FLOW #10
Includes activities necessary to duplicate microfiche, back if required, collate and mail to users or place copies in stock or depository sets. Microfiche of documents announced in STAR will not be produced with the white title backing. Only microfiche of documents announced in STAR will be available and distributed in accession number order. Approximately 95% of any given STAR issue will be distributed in accession number order. Reissues, errata and carry-overs will be distributed in a separate group. Current NASA policies of stock maintenance will continue to be implemented.

7. SDI/SCAN
   a. SDI (Per profile per 1000 accessions) PROCESS FLOW #11
      Includes all activities necessary for maintenance of profiles, match runs against STAR and IAA accessions and printing and delivery of preaddressed announcements for mailing. includes the collection of responses and analysis of response statistics.
   b. SCAN (Per profile per 1000 accessions) PROCESS FLOW #12
      Includes all activities necessary for maintenance of profiles, match runs against STAR and IAA accessions, printing camera-ready copy, and listing of profile distribution data. Excludes reproduction of distribution copies.

   c. The volumes are specified as the number of accessions on the Document Data File passed against the profiles, not the number of hits.

8. Literature Searches (Each) PROCESS FLOW #13
Includes all activities for production of original machine searches of the Document Data File from analysis and coding of question, machine run, assembly, and dispatch. Includes searches for continuing bibliographies, user-formulated searches and test searches for tape users. Excludes literature search requests completed by duplication of a previous search (see Non-standard Requests and Document Reproduction). Includes searches of microfilmed Langley card catalog. Excludes searches via conventional library tools.

Request Processing

a. Standard (Each) PROCESS FLOW #14
Requests for single documents on Form 492 or revision thereof, from a direct access requester with proper corporate identification and identifying requested document by valid accession number, NASA/NACA formal report number which requires no further identification, or by assigned Literature Search number. Includes verification of requester, initial processing, determination of availability, notification of nonavailability, completion from stock, verification of correct document to verified requester, and mailing of all requests. Excludes reproduction necessary to fill requests (See Document Reproduction).

b. Non-Standard (Each) PROCESS FLOW #15
All requests for documents not meeting the requirements of (a.) above. Includes verification of requester, initial processing, identification if required, response (form letter) if needed, verification of correct document to verified requester, and mailing. Includes all requests requiring acquisition, or response not provided on the Form 492 or revision thereof. Excludes actual acquisition activity. Includes requests for multiple titles, telephone requests, and requests requiring special action (e.g., hold for reprint). Includes each title of multiple title requests as a separate item, and multiple copies of the same document as a single item. Includes processing of requests for literature searches which are completed by duplicating a previous search. Excludes reproduction to fill requests (see Document Reproduction).

c. Both (a,) and (b.) include the operation of the appropriate warehouse involved (Classified or Unclassified). Final processing of only security classified documents is to include receipt completion, maintenance of receipt file, security wrapping, and premium mailing (certified or registered mail).

Document Reproduction (Per 1000 pages) PROCESS FLOW #16
Includes activities necessary for the reproduction of documents to fill requests or replenish stock. Includes duplication of previous searches to fill a literature search request. Includes duplication of copies (but not preparation of copy) of such lists as the Subject Authority List. Excludes Accession Cards and Abstract Cards. Per 1000 pages refers to copies of document pages.

Tapes Duplicated (Each) PROCESS FLOW #17
Includes selection of data from either the Document Data File or the Master Address Authority File, duplication on reels supplied and packing for shipment. Includes initial provision of basic Document Data File on a reel-by-reel basis. Includes provision of back data update information, re-runs of tapes "lost" by users or unusable because of poor tape quality. Includes sorting MAA in Zip Code order for Langley. Excludes field trips, seminars, test runs of search problems (see Literature Searches), and special programs required for data selection. Excludes preparation and distribution of Subject Authority Lists and Corporate Source Authority Lists (see Computer-Produced Pages and Document Reproduction).

Accession Cards (Per Accession) PROCESS FLOW #18
Includes stripping of data from the file, formatting, and computer listing. Includes duplication of current quantity of 44 copies of each card, cutting, and distribution to 9 current addresses. Includes only cards produced from computer listings.

13. Abstract Cards
Includes photography, printing, and paste-up of duplicate abstracts from announcement journals to produce abstract cards; includes duplication, cutting, sequencing when required, and distribution. Includes such cards used in lieu of accession cards.
a. IAA Abstract Cards (Per Accession) PROCESS FLOW #19
Includes duplication of current quantity of 34 copies of each card and 1 set of offset plates, cutting, perforating, sequencing and distribution to 15 current addresses.
b. STAR Abstract Cards (Per Accession) PROCESS FLOW #20
Includes duplication of current quantity of 78 copies of each card and 1 set of offset plates. Includes cutting, perforating and distribution of 44 copies to 9 current addresses in lieu of accession cards. Includes cutting, perforating, sequencing, and distribution of 34 copies, plus the offset plates, to 13 current addresses.

14. Tech Briefs
a. Candidates Reviewed(Each) PROCESS FLOW #21
Includes all costs associated with receiving Flash Sheets forwarded by NASA as candidates for Tech Briefs, reviewing for innovation, significance, etc., and returning to NASA either as a recommended rejection or as a draft Tech Brief with art.
b. Composed (Each) PROCESS FLOW #22
Includes all costs associated with the preparation and delivery of camera-ready copy for edited Tech Briefs returned from NASA for composition. Reflects one submittal to NASA of camera-ready copy. Return for any change in the art or text other than substantive errors of fact or composition is a new input and delivery.

15. Master Address Authority Maintenance (Per transaction applied) PROCESS FLOW # 23
Includes cost of receiving change notifications, preparing input forms, keying transaction cards, and update of the file. Includes maintenance of registration records for each entry on the MAAL and an evaluation program to insure MAAL accuracy. Includes transactions generated externally or internally (e.g., contract expiration, etc.).

16. Special Indexing, Input Pages (Each) PROCESS FLOW #24
Includes conventional indexing (e.g., subject and author indexing) of input material through the preparation of clean manuscript (typed) copy. Proposal is based on pages received for indexing. Excludes preparation of camera-ready copy by computer or photocompostion (see Other Composed Pages).

17. Specifications and Standards, Items In (Each) PROCESS FLOW #25
Includes input of additions and changes to the file of Specifications and Standards records (see Table of Document Accessions) through keypunch and update. Excludes publications (see Other Composed Pages).

18. Thesaurus Keypunching (Per card punched) PROCESS FLOW #26
Includes keypunching of term review forms and changes to the Thesaurus file. Includes keypunching SDI and SCAN profiles in Thesaurus language. Includes keypunching of "trail" information from current vocabulary to Thesaurus. Excludes updating Thesaurus file (absorbed in Accessions to File) and production of outputs (see Computer-Produced Pages, Camera-Ready and Document Reproduction).

APPENDIX C

Typical Account Structures

Typical Account Structure for a Large Organization

Code	
	SALARIES AND WAGES
01	Salaries and Wages
02	Overtime Premium
05	Holiday Pay Accrual
06	Vacation Pay Accrual
07	Sick Leave Pay
08	Administrative Leave Pay
09	Unapplied Direct Labor
	EMPLOYEE INSURANCE, PAYROLL TAXES
11	Hospitalization, Group Life Insurance
12	Employee Retirement Plan
13	Workmen's Compensation Insurance
14	State Unemployment Insurance
15	Federal Unemployment Insurance
16	FICA
17	Disability Insurance
	SERVICE COST CENTERS
21	Xerox Cost Center
22	Print Shop
23	Photolab
24	Messenger Service
	MATERIALS, SUPPLIES, SERVICES
31	Paper, Forms
32	Photographic Paper, Film
33	Data Processing Materials
35	Expensed Equipment
36	Other Materials, Supplies
39	Inventory - College Park
-	Spare Parts
	PRODUCTION EQUIPMENT UTILIZATION
41	Photon 200
42	Photon 713
	DATA PROCESSING EQUIPMENT UTILIZATION
52	Keypunch
55	EAM
	OTHER COSTS
61	Travel and Per Diem
62	Telegraph, Telephone (Long Distance Only)
63	Shipping, Freight, Mail
64	Other Equipment Rental and Service
65	Publications, Subscriptions, Books
66	Professional Dues, Membership
67	Amortization of Product Development
68	Purchased Services
69	Miscellaneous

OCCUPANCY COSTS

71	Building Rent
72	Building Maintenance, Repairs, Supplies, Services
73	Security Expenses (Guards, Alarm)
74	Communication Expenses
75	Utilities (Electric, Gas, Heat, Water)
76	Amortization of Leasehold Improvements
77	Depreciation of Machinery, Equipment
78	Depreciation of Furniture, Fixtures

CORPORATE EXPENSES

81	Employee Relocation, Recrutiment
82	Employee Tuition Refunds
83	Employee Welfare
84	Directors, Stockholder Relation Expenses
85	Insurance
86	Professional Fees
87	Auto Rental, Maintenance
88	Property Taxes
89	State Income Taxes
-	Other Corporate Expenses

360 COMPUTER USAGE

91	360/20
93	360/30
94	360/40
95	360/50
9A	1401 Computer

Account	
	DIRECT LABOR
501	Direct Labor - Regular
503	Sick Leave Taken
505	Administrative Leave Taken
507	Vacation Accrual
509	Holiday Taken
	MATERIALS & SUPPLIES
511	Data Processing Materials
513	Printing Supplies
515	Expendable Assets
517	Other Materials & Supplies
	PURCHASED SERVICES
521	Computer Services
523	Data Preparation (Flexowriting, Keypunching, etc.)
525	Printing & Duplication
527	Photocomposition
531	Consultants
533	Graphics
535	Other Purchased Services
	OTHER DIRECT
551	Overtime Premium
552	Travel & Entertainment (Including Overtime Meals)
553	Dues, Memberships, Publications, etc.
554	Telephone & Telegraph
555	Postage & Freight (Including Messenger Service)
556	Equipment Rentals
557	Production Equipment Maintenance
558	Office Equipment Maintenance
	OCCUPANCY
561	Rent
562	Depreciation, Furniture & Equipment
563	Leasehold Improvements & Maintenance

* Direct Accounts Only.

APPENDIX D

Typical Organization Code Structure

Typical Organization Code Structure

First Digit	1 - College Park
Second Digit	0 - Director, Facility 1 - Associate Director 2 - Assistant Director for Facility Services 3 - Assistant Director for Facility Publications 4 - Assistant Director for Facility Systems
Third Digit	Departmental
Fourth Digit	Branch or Section

ORGANIZATION	CODE
Director	1000
Associate Director	1100
Special Assistant to the Associate Director	1100
Security Office	1110
Building Administration	1111
Facility Controller	1120
Statistics Branch	1121
Quality Assurance & Methods	1140
Methods Management	1141
Assistant Director for Facility Services	1200
Tech Briefs	1220
Document Services Department	1230
Request Processing	1231
Unclassified Supply	1232
Classified Supply	1233
Document Reproduction	1234
Xerox Center	1235
Messenger & Mailroom	1236
Reference Department	1240
Machine Searches	1241
SDI/SCAN	1242
Acquisitions	1243
Reference Services	1244
Assistant Director for Facility Publications	1300
Processing Department	1310
Cataloging	1311
Abstracting & Indexing	1312
Input	1313
Special Projects	1314
Reprography Department	1320
Microfiche Production	1321
Photo Lab	1322
Print Shop	1323
Publications Department	1330
Review	1331
EAM	1332
Keypunch	1333
Photon	1334
LCC	1335
Make-up	1336
Graphic Arts	1337
NPS Coordination	1338

ORGANIZATION	CODE
Assistant Director for Facility Systems	1400
Systems Department	1410
Programming Department	1420
Computer Operations Department	1430
NASA Representative	1888

APPENDIX E

Typical Information System Functions

APPENDIX E
Page One

Typical Information System Functions ☆

CODE	ACTIVITY
(301)	Management & Supervision
(302)	Staff Activities
(303)	Clerical Support
(304)	Training
(309)	Illustration
(310)	Cataloging
(311)	Categorizing
(312)	Indexing
(313)	Abstracting
(315)	Receiving
(316)	Duplicate Checking)
(318)	DOD Document Processing
(319)	Accessioning
(320)	Identification
(322)	Equipment Maintenance
(323)	Filing
(324)	Messenger Services
(325)	Packing & Shipping
(326)	Keyboarding
(327)	Title Preparation
(328)	Page Make-up
(330)	Proofreading
(331)	Editing & Overview
(332)	Inspecting & Assembly
(333)	Non-Productive Time
(334)	Request Processing
(335)	Analysis & Edit
(337)	Filming
(341)	Title Backing
(343)	Operating EAM Equipment
(344)	Operating Computers
(346)	Operating Photocomposition Machines
(349)	Operating Microfiche Blowback Equipment
(350)	Document Duplication
(351)	Phototlab Operations
(352)	Bindery Operation
(354)	Microfiche Cutting

☆ PARTIAL. NASA Scientific and Technical Information Facility, FY67.

APPENDIX E
Page Two

Typical Information System Functions ≠

CODE	ACTIVITY
01	Management
02	Secretarial
03	Reporting (Report Preparation)
04	Documentation (Systems, Procedures, etc.)
05	Technical Writing (Other Than Documentation)
06	Communications & Research (Meetings, Travel, etc.)
10	Systems & Programming
21	Acquisitions (Not currently used)
22	Document Assignment
23	Document Analysis
24	Resume Editing
25	Printout Editing
26	Duplicate Checking
31	Lexicography
32	Reference Activities
41	Typing
42	Flexowriting
43	Keypunching (And Verifying-not currently used)
44	Key to Tape (Not currently used)
46	Proofreading
51	Document Control
52	Shipping

≠ ERIC Processing and Reference Facility, Current.

SPECIAL NOTES:

Document Analysis (23) is the preparation of a complete resume from a raw document, and includes descriptive cataloging, indexing, and, where necessary, abstracting.

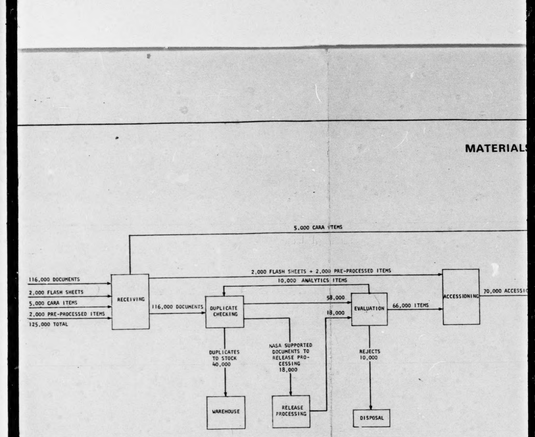
Resume Editing (24) includes review and editing of a resume form prepared by someone else, whether within the Facility or out of it, and whether or not the document must be consulted.

Printout Editing (25) includes review and correction or edit of computer printouts of resumes and/or indexes. When using this function, do not attempt to separate by product number different input products appearing in the printout (e.g. RIE Regular and RIE Irregular). Charge the major product only (for the example above, charge RIE Regular).

Proofreading (46) is the comparison of a keyed copy against an original to verify accurate keying, without regard to content.

APPENDIX F

Materials Balance and Process Flow Charts



Assigned documents are then forwarded to the Cataloging Branch (L-4) which determines and records on the DPS the descriptive cataloging data. Documents which are announced in formal publications are forwarded to Categorizing (K-5) where each is assigned to one of the 34 subject categories into which the announcement journals are divided before being sent to the Abstracting & Indexing (A & I) Branch (L-6). Documents which are indexed, but not announced, are forwarded directly from Cataloging to A & I Branch, and documents which are only cataloged are forwarded to Accessioning (J-4).

In the A & I Branch (L-6), indexers select from the NASA Thesaurus (NASA SP-7030), subject terms which describe the content of the document and enter these on the DPS. For documents to be announced, the more significant of these terms, with respect to the document, are designated for the use in the journal indexes and from them, a Notation of Content is prepared. The Notation of Content is a revised or expanded title used in the journal indexes in lieu of the title to provide a more subject oriented description of the document.

Indexed documents and DPS are forwarded to Accessioning (J-4). The Accessioning Group assigns to each item received, the next sequential accession number in the appropriate series, records this on the document, DPS, and a control card which provides feedback to the Input Station and the Warehouses. The DPS is then broken apart. One copy is forwarded to Keypunch (D-9), a second copy is forwarded with the Abstract (See Process Flow #2) to Control Desk (K-7) and the third copy along with the document is forwarded either to the Microfiche Receiving Area (J-12, See Process Flows #8 and #9) or to the Warehouse (F-16).

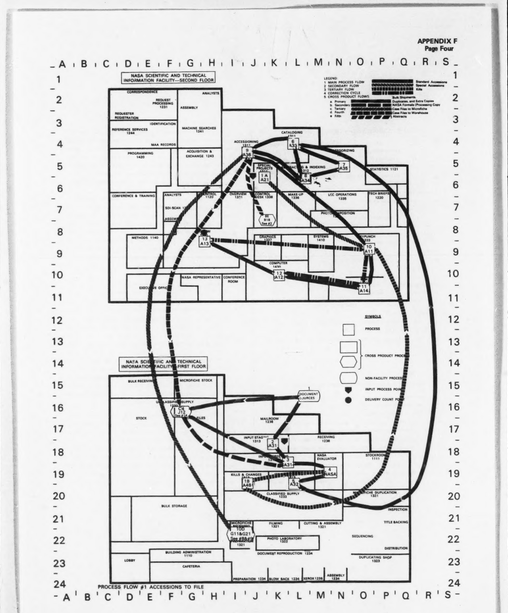
The data entered on the Keypunch copy of the DPS is keypunched and verified (D-9). At this point, the main process flow is joined by two subsidiary flows. The first of these are the Special Accessions (e.g. Published Tech Briefs, Items to be announced in Reliability Abstracts and Technical Reviews (RATR), etc.). These items upon receipt are forwarded directly to the Special Projects Group (J-6) where all of the appropriate operations of steps 3 thru 9 of the main process flow are performed, and data for machine entry is forwarded to Keypunch (D-9). The tertiary flow originates in the Input Station (J-19) whenever it is necessary to remove an accession record from the file because of changes in classification or distribution limitations, supersession, etc. A kill from (Rejection Notification, Form 432) is generated and forwarded to Keypunch (D-9) where transactions are punched to remove the entire accession record from the file and replace it with a historical note describing the reason for the kill and the disposition of the document. Items removed from the file for classification or distribution limitation changes are re-submitted to the NASA Evaluator (M-19) for possible re-entry into the system in another series.

From Keypunch, the cards are sent to EAM (D-11) where they are counted as a check on computer update activity and the hate record cards are listed to provide detailed record transaction counts.

From EAM, the cards are forwarded to Computer Operations (K-10), where the Document Data File is updated. The update program produces error and activity lists which are forwarded to the Review Branch (K-9).

The Review Branch checks the error and activity lists and generates any necessary corrections which are returned to Keypunch for punching and inclusion on the next update. Delivery counts are made at this point from a summary which follows the activity listing.

APPENDIX F
Page Four


NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY--SECOND FLOOR
NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY--FIRST FLOOR
PROCESS FLOW #1 ACCESSIONS TO FILE

APPENDIX F
Page Five

PROCESS FLOW: #14 REQUEST PROCESSING - STANDARD & NONSTANDARD

SEQ. NO.	PROD. NO.	FUNCTION	ORG.	COORD.
1	J11	PROCESS REQUESTS	1304	E-2
2	J11	PROCESS REJECTS	1311	F-2
3	J12	PULL FROM UNCLASSIFIED STOCK IF AVAILABLE	1232	F-16
4	J12	PULL FROM CLASSIFIED STOCK IF AVAILABLE	1233	J-20
5	J16	MAIL TO REQUESTERS	1236	J-17
REPRODUCED DOCUMENTS				
3B	(K12 & K13)	REPRODUCE DOCUMENTS	1234	J-24
STATISTICAL RECORDS				
6A	J13	KEYPUNCH STATISTICAL DATA	1333	N-9
7A	J14	COMPILE STATISTICAL REPORTS	1332	P-11
HOLDINGS & DIRECT ACCESS LISTS				
1C	J15	COMPILE AND LIST	1430	K-10
PRIOR SEARCHES				
1D	J17	FILL REQUESTS FOR PRIOR SEARCHES	1241	M-2
MICROFICHE STOCK				
1E	(L39)	SUPPLY OR REPLENISH STOCK	1321	P-22
BULK SHIPMENTS, DUPLICATES, & EXTRA COPIES				
1F	(SOURCES)	BULK SHIPMENTS TO STOCK		L-16
2F	(A31)	RECEIVE PROCESSING COPY OF NASA FORMATS, FORWARD DUPLICATES & EXTRA COPIES TO STOCK	1313	L-18
CASE FILES				
1G	(A36)	NON MICROFICHED CASE FILES TO WAREHOUSE	1311	J-4
2G	(G15 & G22)	MICROFICHED CASE FILES TO WAREHOUSE	1321	K-22
3G	J12	RECEIVE, STORE CASE FILES, SUPPLY FOR REPRODUCTION	1232	G-18

PROCESS FLOW #14 REQUEST PROCESSING - STANDARD AND NONSTANDARD

The processing of requests, both standard and nonstandard begins with the receipt of the request by the Request Processing Branch (E-2). (The factors which distinguish a nonstandard request from a standard one are essentially added work, and the flow of this added work only is shown in Process Flow #15. Eventually, nearly all nonstandard requests merge into the flow shown here.)

The first operation in the process consists of determining from the requester's address and/or requestors identification code on the Document Request Form (Form 492) whether or not the requester is authorized to receive documents from the Facility and what his profile is. This profile is a three-character code which indicates the kinds of documents he is eligible to receive. This is determined with the use of a Direct Access Requester List which is produced in Computer Operations (K-10) from the Master Address Authority File. When eligibility has been established, the nature of the document requested is determined by checking the accession number against a Holdings List, which indicates the kind of distribution which the document can be given. This Holdings List is generated in Computer Operations (K-10), from the Document Data File. If, upon comparison of the two profiles, it turns out that the requester is not eligible to receive the document requested, the request form is sent to the Correspondence Unit (F-2), which checks the reason for not filling the request on the back of one copy of the form, inserts it in an envelope and sends it to the Mailroom (J-17).

Requests which can be filled are sent, still in accession number order, to the Unclassified Supply Branch (F-16), where they are checked against the stock which is also maintained in that order. If stock is available, the request form is inserted in a copy of the Document which is then forwarded to the Mailroom (J-17). Stocks are received in the Warehouse (F-16) from several sources; bulk shipments of NASA Formal reports are received directly from the printer, in which case a processing copy is sent to Input Screening (See Process Flow #1); Extra copies and duplicates of accessioned documents are received from Input Screening (See Process Flow #3); and stocks of microfiche are received from Microfiche Distribution (See Process Flow #10).

The case files (G-18) are folders containing the processing copy of each document and associated papers and forms. They are maintained as a permanent record and as a source for Document Reproduction (See Process Flow #16). They are received either from the Accessioning Group (See Process Flow #1), or from the Microfiche Cutting and Assembly Area (See Process Flow #8 and #9).

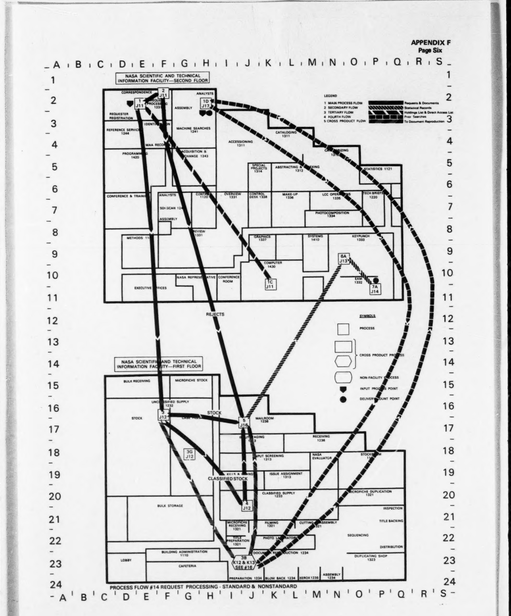
Requests for Documents which are classified are forwarded through Unclassified Supply (F-16) to Classified Supply (J-20) which completes the request, accomplishes the wrapping and classified material control procedures, and forwards it to the mailroom (J-17).

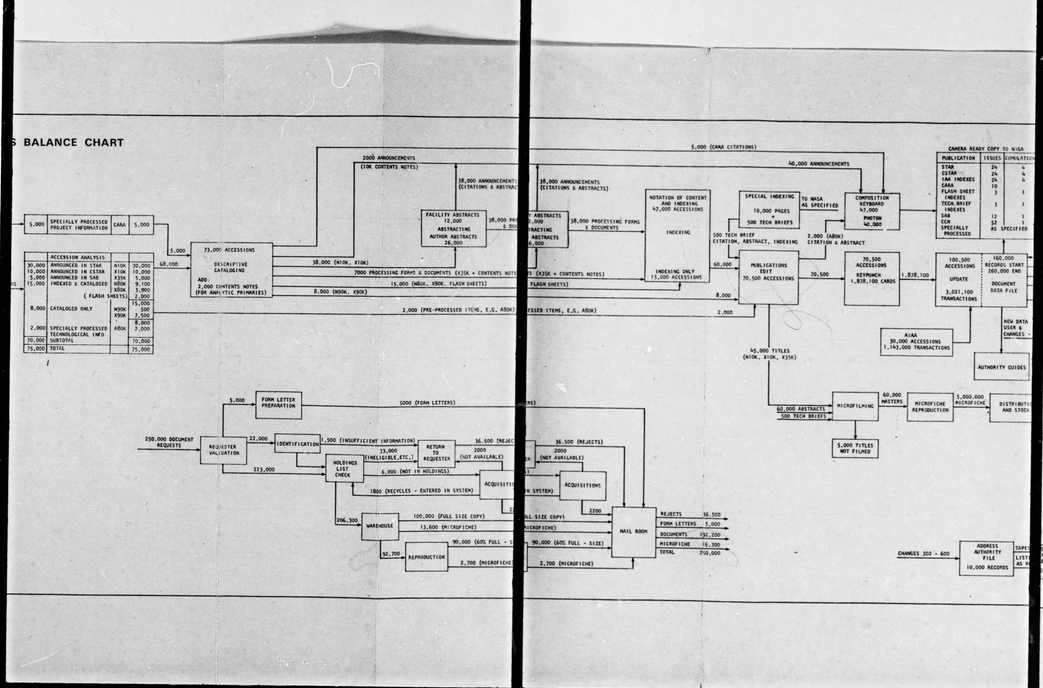
The Mailroom (J-17) receives all completed requests and wraps, labels, and/or mails them to the requesters after removing and completing the statistical copy of the request form. The statistical copy is forwarded to Keypunch Branch, (K-9), which produces punched cards and forwards them to EAM Branch (F-11). EAM listings and statistical summaries are produced there to establish production counts and provide information for monitoring performance.

Requests which can not be completed from stock in the Warehouse (F-16) are forwarded to Document Reproduction (J-24), where the requested document is reproduced. (See Process Flow #16.) Reproduced documents, with the request form, are sent from Document Reproduction (J-24) to the Mailroom (J-17).

The only standard request which does not merge with the main flow is the request (by exact title or Search Number) for a Literature Search previously accomplished. These are received directly by the Machine Searches Branch (K-2), which supplies a copy if an entry is available, or has one reproduced in Document Reproduction (J-24) if necessary. Those requests are recorded and reported separately.

APPENDIX F
Page Six


NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY--SECOND FLOOR
NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY--FIRST FLOOR
PROCESS FLOW #14 REQUEST PROCESSING STANDARD & NONSTANDARD



APPENDIX F
Page One

62%

APPENDIX F
Page Two

Materials Balance Table[a]

	DAILY RANGE Begin	End	DAILY AVERAGE	ANNUAL REQUIREMENT 252 DAYS
4. ACCESSIONS ANALYSIS				
a. From AD Number Processing	56	66	61	15,372
b. From Evaluation	197	227	212	53,424
c. TOTALS IN	253	293	273	68,796
To Categorizing				
d. N10K	120	140	130	32,760
e. X10K	51	71	61	15,372
f. X35K	11	11	11	2,772
To Descriptive Cataloging				
g. N80K	33	33	33	8,316
h. X80K	12	12	12	3,024
i. N90K	1	1	1	252
j. X90K	8	8	8	2,016
k. X50K CSTAR Sec. Supplement	7	7	7	1,764
l. Z10K PAR	10	10	10	2,520
SUBTOTALS	253	293	273	68,796
m. To Special Indexing(Flash Sheets)	8	8	8	2,016
n. To Special Indexing (CARA)	15	25	20	5,040
o. To Vocabulary Control (A80K)	8	8	8	2,016
p. To Vocabulary Control (RATR)	3	3	3	756
q. Subtotals	34	44	39	9,828
r. TOTAL INTO SYSTEM	287	337	312	78,624
5. DESCRIPTIVE CATALOGING				
a. From Category Assignment	182	222	202	50,904
b. From Accessions	71	71	71	17,892
c. Add: Contents Notes(Analytic Primary)	2	2	2	504
d. Add: Contents Notes (Other)	2	4	3	756
TOTALS IN	257	299	278	70,056
e. To Abstracting & Indexing	244	284	264	66,528
f. To Vocabulary Control (90K)	9	9	9	2,268
g. To Photon (Contents Notes)	4	6	5	1,260
h. TOTALS OUT	257	299	278	70,056
6. ABSTRACTING & INDEXING				
a. From Descriptive Cataloging	244	284	264	66,528
b. Facility Abstract, NOC & Index (33% of 10K + 50K)	58	72	65	16,380
c. NOC & Index (35K, Z10K Analytic Primary)	25	27	26	6,552
d. Author Abstract Index & NOC	116	140	128	32,256
e. (Rest of 10K & 50K)				
f. Index Only (80K)	45	45	45	11,340
g. TOTALS PROCESSED	244	284	264	66,528
h. Abstracts to Photon	174	212	193	48,636
i. Indexing to Voc. Control	244	284	264	66,528
j. TOTAL ITEMS OUT	418	496	457	115,164

[a]NASA Scientific and Technical Information Facility, FY66
Documentation, Inc. April 1965

88

APPENDIX F
Page Three

PROCESS FLOW: #1 ACCESSIONS TO FILE

SEQ. NO.	PROD. NO.	FUNCTION	ORG.	CONNS.
REGULAR ACCESSIONS				
1		DOCUMENT SOURCES	---	L-16
2	A31	INPUT STAGING	1313	K-18
3	A31	INPUT SCREENING	1313	L-18
4	N45A	EVALUATION	(NASA)	M-19
5	A32	ISSUE ASSIGNMENT	1313	L-19
6	A33	CATALOGING	1311	L-4
7	A35	CATEGORIZING	1312	M-5
8	A34	INDEXING	1312	L-6
9	A36	ACCESSIONING	1311	J-4
10	A11	KEYPUNCH	1333	N-9
11	A14	EAM	1333	O-11
12	A12	COMPUTER UPDATE	1430	K-10
13	A13	REVIEW AND CORRECTION	1331	N-9
NONSTANDARD ACCESSIONS				
1A	A21	NONSTANDARD PROCESSING (STEPS 3 THRU 9 ABOVE)	1314	D-6
KILLS				
1B	A48	INITIATE KILL (FORM 433)	1313	J-19
BULK SHIPMENTS, DUPLICATES, AND CASE FILES				
4C	(J12)	STORE DOCUMENTS FORWARD PROCESSING COPY	1232	F-16
DOCUMENTS FOR MICROFICHE				
10D	B01 & G12	RECEIVE DOCUMENTS TO BE MICROFICHED	1321	I-21
ABSTRACTS				
9E	B1B	RECEIVE ABSTRACTS	1338	K-7

PROCESS FLOW #1 ACCESSIONS TO FILE

The Accessions to File process begins at step 1 (L-16) with worldwide sources forwarding documents to the Facility. Most of these are brought in directly to the staging area of the Input Station for step 2 (K-18). However, NASA formal reports, which are received in bulk quantities, are forwarded directly to the Unclassified Warehouse (F-16) and a single copy for processing is forwarded from there to Input Screening (L-18).

The Input Staging process (K-18) assembles the document with the peripheral elements necessary for processing. In the case of documents received from cooperating agencies (e.g. Defense Documentation Center or Atomic Energy Commission), the required elements are the microfiche prepared by the other agency (See Process Flow #5) and the abstract (See Process Flow #2). In the case of documents received from NASA contractors, the required element is an authorization from the cognizant Project Office for the level of dissemination. If there is a blanket

APPENDIX G

Unit Cost Reporting Formats

97

	Prod. Class	Description	Quantity Produced and Units (9)	Direct Labor	Fringe (2)	Data Prep.	Computer Services	Printing and Duplic.
		Total Costs (1)		$250,000	$25,000	$25,000	$75,000	$50,000
GENERAL	Axx	Management and General		75,335	7,533			6,838
GENERAL	Bxx	System Maintenance		15,000	1,500		12,500	200
GENERAL	B10	Computer Operations		18,000	1,800			10
SUPPORT	Lxx	Reference General		1,500	150			
SUPPORT	L5x	Ref. Request Processing	18,000 Requests	9,000 0.5000	900 0.0500			180 0.0100
SUPPORT	D5x	Thesurus Maintenance		1,800	180			
SUPPORT	Dxx	Descriptors to File	700 Terms	2,800 4.0000	280 0.4000	1,575 2.2500	2,100 3.0000	7 0.0100
SUPPORT	S50	Source Dir. Maintenance		1,800	180			
SUPPORT	Sxx	Source Codes to File	2,100 Codes/Names	2,730 1.3000	273 0.1300	1,575 0.7500	2,100 1.0000	21 0.0100
INPUTS	Pxx	Acquisitions Program		18,000	1,800			500
INPUTS	Rxx	Report Resumes, ALL (ROx, RSx) (11)	20,000 Resumes	71,000 3.5500	7,100 0.3550	20,000 1.0000	25,000 1.2500	20 0.0010
INPUTS	ROx	Report Resumes, Regular Only	15,000 Resumes	22,500 1.5000	2,250 0.1500	15,000 1.0000	25,000 1.6667	15 0.0010
INPUTS	RSx	Report Resumes, Full Processing	5,000 Resumes	48,500 9.7000	4,850 0.9700	5,000 1.0000		5 0.0010
INPUTS	JOx	Journal Article Processing	12,000 Resumes	19,200 1.6000	1,920 0.1600			480 0.0400
INPUTS	Cxx	Acquisitions Data to File	30,000 Records	630 0.0210	63 0.0021	1,850 0.0617	1,350 0.0450	24 0.0008
OUTPUTS	Yxx	Linotron Tapes (incl. CPC)	90 Tape Reels	45 0.5000	5 0.0556		3,150 35.0000	
OUTPUTS	Kxx	MDS Tapes (Contract Only)	600 Tape Reels	1,800 3.0000	180 0.3000		5,100 8.5000	
OUTPUTS	Txx Hxx	Computer Pages	39,000 Pages	390 0.0100	39 0.0001		13,650 0.3500	
OUTPUTS	Wxx	Photocomposed Pages	8,000 Pages	800 0.1000	80 0.0100		3,600 0.4500	
OUTPUTS	Uxx	Computer-Onto Microfilm Pages	9,000 Pages	90 0.0100	9 0.0010		2,700 0.3000	
OUTPUTS	Mxx Nxx	Pages Reproduced	1,800,000 1,000 Pages	1,800 1.0000	180 0.1000			41,400 23.0000
OUTPUTS	Gxx	Accessions to EDRS	20,000 Resumes	2,600 0.1300	260 0.0130			20 0.0010
SPECIALS	E99	Special Services					3,500	350
SPECIALS	Exx	Manifold System Test					2,180	218

FOR THE PERIOD

	G	H	I	J Distributions (3)		K
	Other (1)	Subtotal Direct Costs	Management (4)	Computer Operations (5)		Other (6)
	$75,000	$500,000	$ -0-	$ -0-	$ -0-	
	45,294	135,000	(135,000)			
	3,650	32,850	12,150	5,000		
	2,090	21,900	8,100	(30,000)		
	1,270	2,920	1,080			(4,000)
	140 0.0078	10,220 0.5678	3,780 0.2100			4,000 0.2222
	210	2,190	810			(3,000)
	655 0.9357	7,417 10.5957	2,743 3.9186	840 1.2000		3,000 4.2857
	210	2,190	810			(3,000)
	718 0.3419	7,417 3.5319	2,743 1.3062	840 0.4000		3,000 1.4286
	4,520	24,820	9,180			
	980 0.0490	124,100 6.2050	45,900 2.2950	10,000 0.5000		
	935 0.0623	65,700 4.3800	24,300 1.6200	10,000 0.6667		
	45 0.0090	58,400 11.6800	21,600 4.3200			
	1,760 0.1467	23,360 1.9467	8,640 0.7200			
	69 0.0023	3,986 0.1329	1,474 0.0491	540 0.0180		
	260 2.8889	3,460 38.4445	1,280 14.2222	1,260 14.0000		
	191 0.3183	7,271 12.1183	2,689 4.4817	2,040 3.4000		
	915 0.0235	14,994 0.3845	5,546 0.1422	5,460 0.1400		
	6,149 0.7686	10,629 1.3286	3,931 0.4914	1,440 0.1800		
	5,122	7,921	2,949	1,080		

DEMONSTRATION C

ION COPY

L Subtotal Direct and Distrib.	M General and Admin. (7)	N Subtotal Direct and G&A	N Subtotal Direct and G&A	O Fee (8)	P Total Cost
$500,000	$150,000	$650,000	$650,000	$100,000	$750,000
50,000	15,000	65,000	65,000	10,000	75,000
18,000 1.0000	5,400 0.3000	23,400 1.3000	23,400 1.3000	3,600 0.2000	27,000 1.5000
14,000 20.0000	4,200 6.0000	18,200 26.0000	18,200 26.0000	2,800 4.0000	21,000 30.0000
14,000 6.6667	4,200 2.0000	18,200 8.6667	18,200 8.6667	2,800 1.3333	21,000 10.0000
34,000	10,200	44,200	44,200	6,800	51,000
180,000 9.0000	54,000 2.7000	234,000 11.7000	34,000 1.7000	36,000 1.8000	270,000 13.5000
100,000 6.6667	30,000 2.0000	130,000 8.6667	130,000 8.6667	20,000 1.3333	150,000 10.0000
80,000 16.0000	24,000 4.8000	104,000 20.8000	104,000 20.8000	16,000 3.2000	120,000 24.0000
32,000 2.6667	9,600 0.8000	41,600 3.4667	41,600 3.4667	6,400 0.5333	48,000 4.0000
6,000 0.2000	1,800 0.0600	7,800 0.2600	7,800 0.2600	1,200 0.0400	9,000 0.3000
6,000 66.6667	1,800 20.0000	7,800 86.6667	7,800 86.6667	1,200 13.3333	9,000 100.0000
12,000 20.0000	3,600 6.0000	15,600 26.0000	15,600 26.0000	2,400 4.0000	18,000 30.0000
26,000 0.6667	7,800 0.2000	33,800 0.8667	33,800 0.8667	5,200 0.1333	39,000 1.0000
16,000 2.0000	4,800 0.6000	20,800 2.6000	20,800 2.6000	3,200 0.4000	24,000 3.0000

NOTES:

1. **Total Costs** — Total costs for all columns are the same as the Year-to-Date cost shown in the Expenditure Report for the corresponding period, except that Other (Column G) is the sum of the following line entries of the Expenditure Report.

Supplies	$ 10,000
Other Purchased Services	$ 15,000
Occupancy	$ 25,000
Other Miscellaneous Costs	$ 25,000
Total Other (Column G)	$ 75,000

2. **Fringe** — Fringe (Column C) is applied as a percentage of Direct Labor (Column B), and is shown at actual.

3. **Distributions** — The purpose of the Distributions (Columns I, J, and K) is to include in the total cost for a product a proportional share of costs which are either general in nature (not identifiable to a specific product) or which remain relatively constant regardless of volume. The negative entries (enclosed in parenthesis) in each column zero out both the column and the line for which the cost is being distributed, since the distributed cost now appears as an added cost of the various product to which it has been allocated. This prevents the distributed cost from being counted twice and keeps the Total Cost entries for the two Subtotal columns (Columns H and L) identical, even though the individual entries in each column are different.

4. **Management Distribution** — Management Distribution (Column I) allocates the cost of Director and staff, occupancy, etc. across all other products in proportion to the total direct costs as shown in Column H.

5. **Computer Operations Distribution** — This distribution (Column J) allocates the Systems and Programming costs attributable to Computer Operations (as opposed to systems design, programming, etc.) and Data Processing Materials costs across all products to which Computer Services are charged. This is allocated in proportion to the Computer Services (Column E) costs for each product.

6. **Other Distributions** — This distribution (Column K) is provided to permit transfer of cost for Reference General (Lxx), Thesaurus Maintenance (D2x, D5x), and Source Directory Maintenance (S50), which are "fixed" costs unrelated to volume processed, into the volume sensitive products immediately below, i.e. Reference Request Processing (L5x), Descriptors to File (Dxx), and Source Codes to File (Sxx),respectively. This separation of "fixed" and volume sensitive costs permits more accurate assessment of the impact of changes in volume, while the transfers allow the inclusion of all costs for the respective operations in a single total for each.

7. **General and Administrative** — G&A costs (Column M) are shown at actual.

8. **Fee** — Fee is shown at % of the subtotal of Direct Costs and G&A.

9. **Quantities** — Quantity Produced (Column A) figures are from the Year-to-Date column of the Weekly Report of Operations for the corresponding period. The Quantity Produced figure for Product 640 (Pages Reproduced) is shown as 1000's of Pages to provide more manageable unit costs.

10. **Unit Costs** — Where a line is divided into shaded and unshaded portions, the figures in the shaded portion are the Year-to-Date costs for the cost element and product and the unshaded portion are the unit costs which are obtained by dividing the dollars in the shaded portion by the number of units in th Quantity Produced & Units column (Column A) for that product. The unit cost is carried to four decimal places to permit display of unit costs which may be quite small for some cost elements of some products, and to simplify rounding. It is not to be considered an indication of accuracy.

11. **Report Resumes, ALL** — This line is a subtotal of the two following lines which distinguish respectively, between resumes for which the Facility is responsible only for editing and machine input, Regular (ROx), and those for which the Facility provides Full Processing, (RSx), i.e. cataloging, indexing, abstracting. These latter include QAD's, IBE input, acquisitioned documents

APPENDIX G
Page One

	Sxx	Source Codes to File	2,100 Codes/Names	2,730 1.3000	273 0.1300	1,575 0.7500	2,100 1.0000	21 0.0100
INPUTS	Pxx	Acquisitions Program		18,000	1,800			500
INPUTS	Rxx	Report Resumes, ALL (ROx, RSx) (11)	20,000 Resumes	71,000 3.5500	7,100 0.3550	20,000 1.0000	25,000 1.2500	20 0.0010
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SPECIALS	E99	Special Services					3,500	350
SPECIALS	Exx	Manifold System Test					2,180	218
						3,750		300

EFF-5.1 (11/70)

8	A34	INDEXING	1312	L-6
9	A36	ACCESSIONING	1311	J-4
10	A11	KEYPUNCH	1333	O-9
11	A14	EAM	1333	O-11
12	A12	COMPUTER UPDATE	1430	K-10
13	A13	REVIEW AND CORRECTION	1331	H-9
NONSTANDARD ACCESSIONS				
1A	A21	NONSTANDARD PROCESSING (STEPS 3 THRU 9 ABOVE)	1314	O-6
KILLS				
1B	A48	INITIATE KILL (FORM 432)	1313	J-19
BULK SHIPMENTS, DUPLICATES, AND CASE FILES				
4C	(J12)	STORE DOCUMENTS FORWARD PROCESSING COPY	1232	F-16
DOCUMENTS FOR MICROFICHE				
10D	(G11 & G12)	RECEIVE DOCUMENTS TO BE MICROFICHED	1321	I-21
ABSTRACTS				
9E	B18	RECEIVE ABSTRACTS	1338	K-7

PROCESS FLOW #1 ACCESSIONS TO FILE

The Accessions to File process begins at step 1 (L-16) with worldwide sources forwarding documents to the Facility. Most of these are brought in directly to the staging area of the Input Station for step 2 (K-18). However, NASA Formal reports, which are received in bulk quantities, are forwarded directly to the Unclassified Warehouse (F-16) and a single copy for processing is forwarded from there to Input Screening (L-18).

The Input Staging process (K-18) assembles the document with the peripheral elements necessary for processing. In the case of documents received from cooperating agencies (e.g. Defense Documentation Center or Atomic Energy Commission), the required elements are the microfiche prepared by the other agency (See Process Flow #9) and the abstract (See Process Flow #2). In the case of documents received from NASA contractors, the required element is an authorization from the cognizant Project Office for the level of dissemination. If there is a blanket release on file in the Input Station, this is referenced, otherwise, a Document Release Form (DRF) is prepared and forwarded to the appropriate NASA office.

When all required peripheral elements have been assembled with the document, it is forwarded to Input Screening (L-18), where it is checked against files of report numbers of document in the system to determine if it has been previously processed. Documents without report numbers are checked against back-up files by contract number, title, etc. Duplicates of documents previously accessioned are annotated with the assigned accession number and forwarded to the Unclassified Warehouse (F-16) to be added to stock. Extra copies of non-duplicates are also forwarded with temporary control number identification for temporary storage until an accession number is assigned, when they are added to stock.

Nonduplicates are forwarded to the NASA Evaluator (M-19) who determines whether and where it will go into the system. His decision is recorded on a

preprinted, three-part processing form which is also used in later steps to record the data which will be entered onto the computer file. From the Evaluator, the document and the Document Processing Sheet (DPS) go to the Issue Assignment Group (L-19) which sorts the documents by series and type, records their entry into the system, and assigns them to the appropriate publications and issues.

Assigned documents are then forwarded to the Cataloging Branch (L-4) which determines and records on the DPS the descriptive cataloging data. Documents which are announced in formal publications are forwarded to Categorizing (N-5) where each is assigned to one of the 34 subject categories into which the announcement journals are divided before being sent to the Abstracting & Indexing (A & I) Branch (L-6). Documents which are indexed, but not announced, are forwarded directly from Cataloging to A & I Branch, and documents which are only cataloged are forwarded to Accessioning (J-4).

In the A & I Branch (L-6), indexers select from the NASA Thesaurus (NASA SP-7030), subject terms which describe the content of the document and enter these on the DPS. For documents to be announced, the more significant of these terms, with respect to the document, are designated for the use in the journal indexes and from them, a Notation of Content is prepared. The Notation of Content is a revised or expanded title used in the journal indexes in lieu of the title to provide a more subject oriented description of the document.

Indexed documents and DPS are forwarded to Accessioning (J-4). The Accessioning Group assigns to each item received, the next sequential accession number in the appropriate series, records this on the document, DPS, and a control card which provides feedback to the Input Station and the Warehouses. The DPS is then broken apart. One copy is forwarded to Keypunch (0-9); a second copy is forwarded with the Abstract (See Process Flow #2) to Control Desk (K-7) and the third copy along with the document is forwarded either to the Microfiche Receiving Area (I-21, See Process Flows #8 and #9) or to the Warehouse (F-16).

The data entered on the Keypunch copy of the DPS is keypunched and verified (0-9). At this point, the main process flow is joined by two subsidiary flows. The first of these are the Special Accessions (e.g. Published Tech Briefs, Items to be announced in Reliability Abstracts and Technical Reviews (RATR), etc.). These items upon receipt are forwarded directly to the Special Projects Group (J-6) where all of the appropriate operations of steps 3 thru 9 of the main process flow are performed, and data for machine entry is forwarded to Keypunch (0-9). The tertiary flow originates in the Input Station (J-19) whenever it is necessary to remove an accession record from the file because of changes in classification or distribution limitations, supersession, etc. A kill form (Rejection Notification, Form 432) is generated and forwarded to Keypunch (0-9) where transactions are punched to remove the entire accession record from the file and replace it with a historical note describing the reason for the kill and the disposition of the document. Items removed from the file for classification or distribution limitation changes are re-submitted to the NASA Evaluator (M-19) for possible re-entry into the system in another series.

Assigned documents are then forwarded to the Cataloging Branch (L-4) which determines and records on the DPS the descriptive cataloging data. Documents which are announced in formal publications are forwarded to Categorizing (N-5) where each is assigned to one of the 24 subject categories into which the announcement journals are divided before being sent to the Abstracting & Indexing (A & I) Branch (L-6). Documents which are indexed, but not announced, are forwarded directly from Cataloging to A & I Branch, and documents which are only cataloged are forwarded to Accessioning (J-4).

In the A & I Branch (L-6), indexers select from the NASA Thesaurus (NASA SP-7030), subject terms which describe the content of the document and enter these on the DPS. For documents to be announced, the more significant of these terms, with respect to the document, are designated for the use in the journal indexes and from them, a Notation of Content is prepared. The Notation of Content is a revised or expanded title used in the journal indexes in lieu of the title to provide a more subject oriented description of the document.

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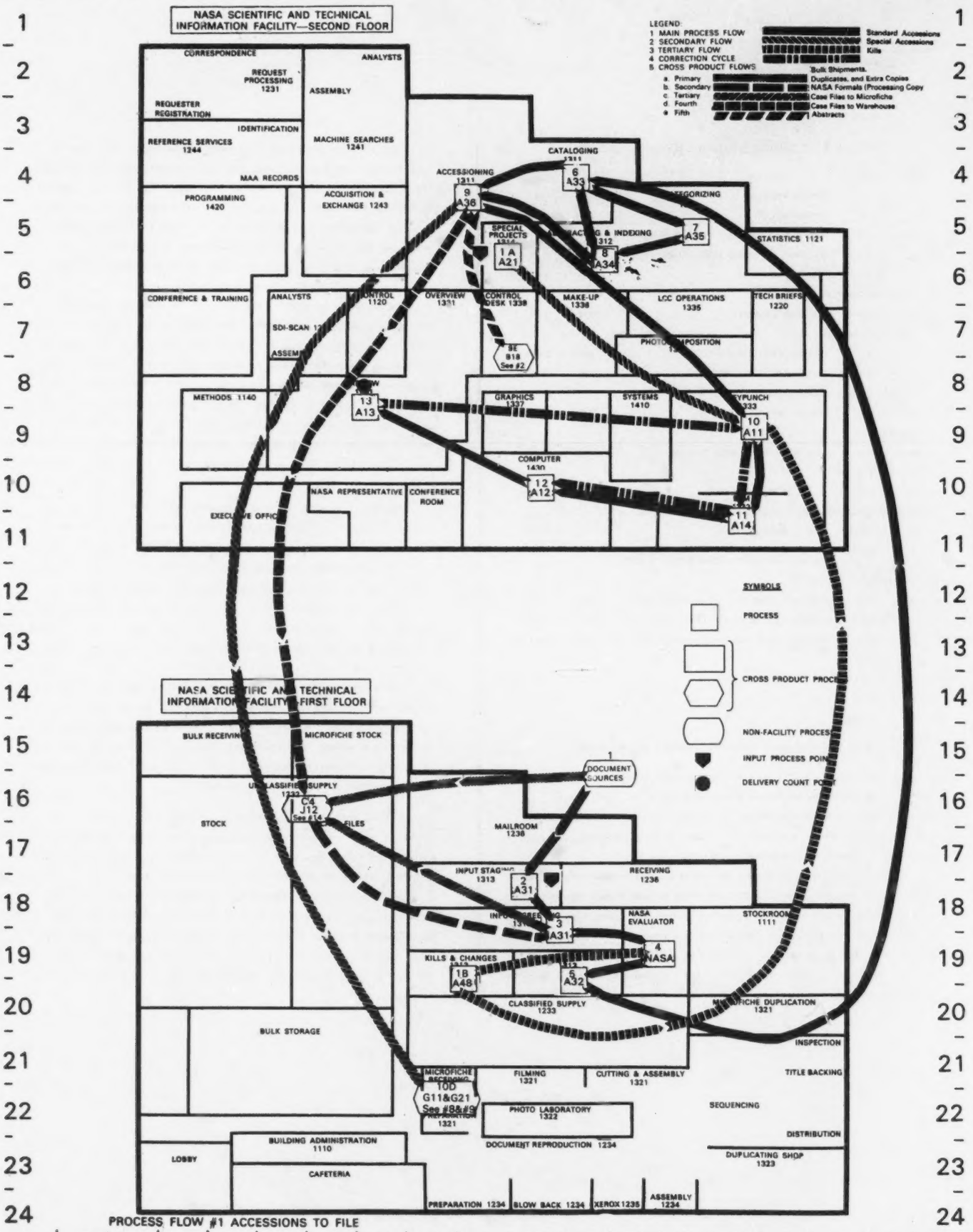
From Keypunch, the cards are sent to EAM (0-11) where they are counted as a check on computer update activity and the base record cards are listed to provide detailed record transaction counts.

From EAM, the cards are forwarded to Computer Operations (K-10), where the Document Data File is updated. The update program produces error and activity lists which are forwarded to the Review Branch (H-9).

The Review Branch checks the error and activity lists and generates any necessary corrections which are returned to Keypunch for punching and inclusion on the next update. Delivery counts are made at this point from a summary which follows the activity listing.



PROCESS FLOW #1 ACCESSIONS TO FILE

PROCESS FLOW: #14 REQUEST PROCESSING - STANDARD & NONSTANDARD

SEQ. NO.	PROD. NO.	FUNCTION	ORG.	COORD.
1	J11	PROCESS REQUESTS	1231	E-2
2	J11	PROCESS REJECTS	1231	F-2
3	J12	PULL FROM UNCLASSIFIED STOCK IF AVAILABLE	1232	F-16
4	J12	PULL FROM CLASSIFIED STOCK IF AVAILABLE	1233	J-20
5	J16	MAIL TO REQUESTERS	1236	J-17
REPRODUCED DOCUMENTS				
3B (K12 & K13)		REPRODUCE DOCUMENTS	1234	J-24
STATISTICAL RECORDS				
6A	J13	KEYPUNCH STATISTICAL DATA	1333	N-9
7A	J14	COMPILE STATISTICAL REPORTS	1332	P-11
HOLDINGS & DIRECT ACCESS LISTS				
1C	J15	COMPILE AND LIST	1430	K-10
PRIOR SEARCHES				
1D	J17	FILL REQUESTS FOR PRIOR SEARCHES	1241	H-2
MICROFICHE STOCK				
1E	(G34)	SUPPLY OR REPLENISH STOCK	1321	P-22
BULK SHIPMENTS, DUPLICATES, & EXTRA COPIES				
1F	(SOURCES)	BULK SHIPMENTS TO STOCK		L-16
2F	(A31)	RECEIVE PROCESSING COPY OF NASA FORMALS, FORWARD DUPLICATES & EXTRA COPIES TO STOCK	1313	L-18
CASE FILES				
1G	(A36)	NON MICROFICHED CASE FILES TO WAREHOUSE	1311	J-4
2G	(G15 & G22)	MICROFICHED CASE FILES TO WAREHOUSE	1321	M-22
3G	J12	RECEIVE, STORE CASE FILES. SUPPLY FOR REPRODUCTION	1232	G-18

PROCESS FLOW #14 REQUEST PROCESSING - STANDARD AND NONSTANDARD

The processing of requests, both standard and nonstandard begins with the receipt of the request by the Request Processing Branch (E-2). (The factors which distinguish a nonstandard request from a standard one are essentially added work, and the flow of this added work only is shown in Process Flow #15. Eventually, nearly all nonstandard requests merge into the flow shown here.)

The first operation in the process consists of determining from the requester's address and/or requestors identification code on the Document Request Form (Form 492) whether or not the requester is authorized to receive documents from the Facility and what his profile is. This profile is a three-character code which indicates the kinds of documents he is eligible to receive. This is determined with the use of a Direct Access Requester List which is produced in Computer Operations (K-10) from the Master Address Authority file. When eligibility has been established,

the nature of the document requested is determined by checking the accession number against a Holdings List, which indicates the kind of distribution which the document can be given. This Holdings List is generated in Computer Operations (K-10), from the Document Data File. If, upon comparison of the two profiles, it turns out that the requester is not eligible to receive the document requested, the request form is sent to the Correspondence Unit (F-2), which checks the reason for not filling the request on the back of one copy of the form, inserts it in an envelope and sends it to the Mailroom (J-17).

Requests which can be filled are sent, still in accession number order, to the Unclassified Supply Branch (F-16), where they are checked against the stock which is also maintained in that order. If stock is available, the request form is inserted in a copy of the Document which is then forwarded to the Mailroom (J-17). Stocks are received in the Warehouse (F-16) from several sources; bulk shipments of NASA Formal reports are received directly from the printer, in which case a processing copy is sent to Input Screening (See Process Flow #1); Extra copies and duplicates of accessioned documents are received from Input Screening (See Process Flow #1); and stocks of microfiche are received from Microfiche Distribution (See Process Flow #10).

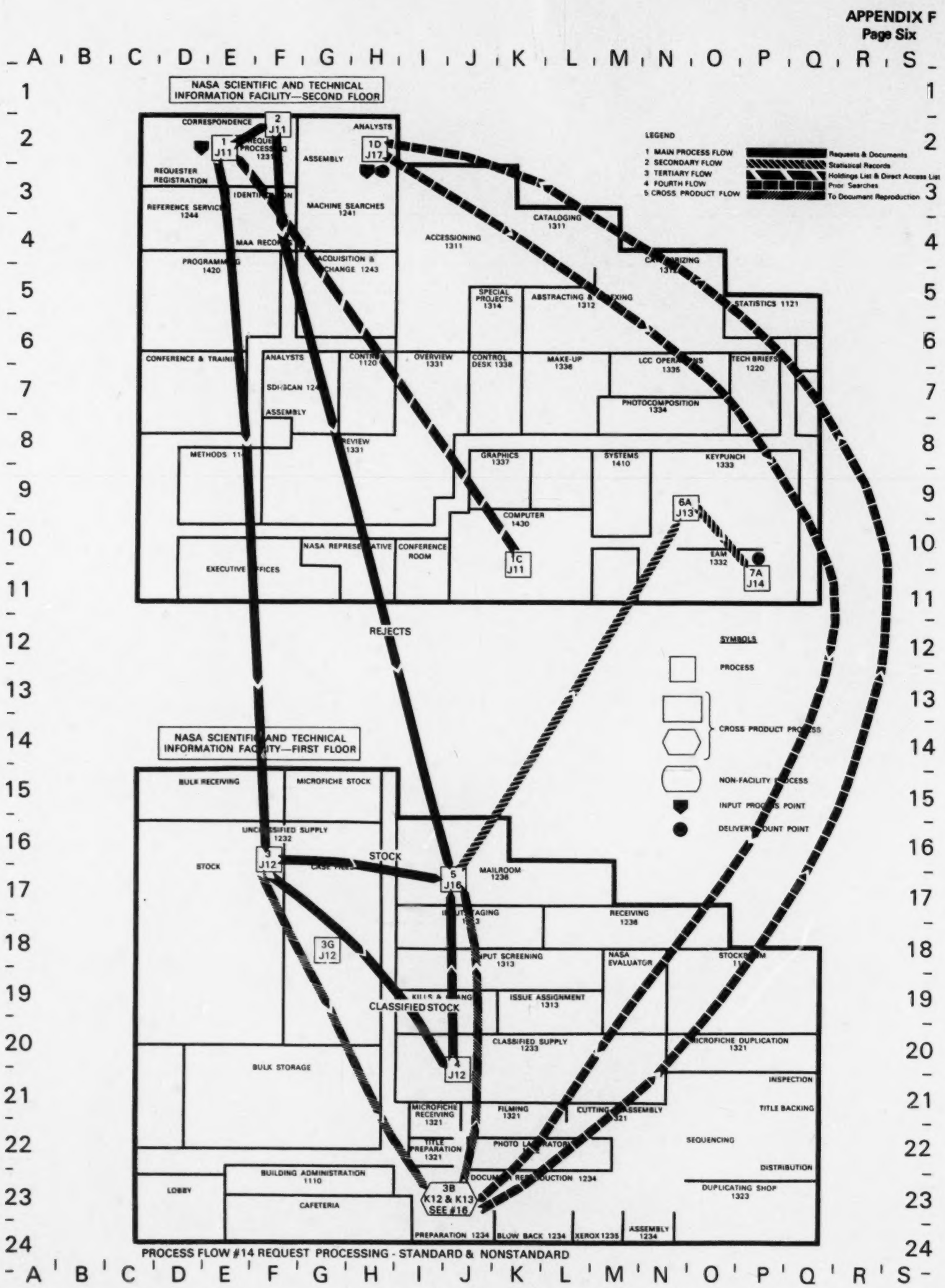
The case files (G-18) are folders containing the processing copy of each document and associated papers and forms. They are maintained as a permanent record and as a source for Document Reproduction (See Process Flow #16). They are received either from the Accessioning Group (See Process Flow #1), or from the Microfiche Cutting and Assembly Area (See Process Flow #8 and #9).

Requests for Documents which are classified are forwarded through Unclassified Supply (F-16) to Classified Supply (J-20) which completes the request, accomplishes the wrapping and classified material control procedures, and forwards it to the mailroom (J-17).

The Mailroom (J-17) receives all completed requests and wraps, labels, and/or mails them to the requesters after removing and completing the statistical copy of the request form. The statistical copy is forwarded to Keypunch Branch, (N-9). which produces punched cards and forwards them to EAM Branch (F-11). EAM listings and statistical summaries are produced there to establish production counts and provide information for monitoring performance.

Requests which can not be completed from stock in the Warehouse (F-16) are forwarded to Document Reproduction (J-24), where the requested document is reproduced. (See Process Flow #16.) Reproduced documents, with the request form, are sent from Document Reproduction (J-24) to the Mailroom (J-17).

The only standard request which does not merge with the main flow is the request (by exact title or Search Number) for a Literature Search previously accomplished. These are received directly by the Machine Searches Branch (M-2), which supplies a copy if an extra is available, or has one reproduced in Document Reproduction (J-24) if necessary. These requests are recorded and reported separately.



PROCESS FLOW #14 REQUEST PROCESSING - STANDARD & NONSTANDARD

APPENDIX G

Unit Cost Reporting Formats

	to File	Codes/Names	1.3000	0.1300	0.7500	1.0000	0.0100	3419	3.5319	1.3062	0.4000	1.4266	
INPUTS	Pxx	Acquisitions Program		18,000	1,800			500	,520	24,820	9,180		
	Rxx	Report Resumes, ALL (ROx, R5x) (11)	20,000 Resumes	71,000 3.5500	7,100 0.3550	20,000 1.0000	25,000 1.2500	20 0.0010	980 0490	124,100 6.2050	45,900 2.2950	10,000 0.5000	
	ROx	Report Resumes, Regular Only	15,000 Resumes	22,500 1.5000	2,250 0.1500	15,000 1.0000	25,000 1.6667	15 0.0010	935 0623	65,700 4.3800	24,300 1.6200	10,000 0.6667	
	R5x	Report Resumes, Full Processing	5,000 Resumes	48,500 9.7000	4,850 0.9700	5,000 1.0000		5 0.0010	45 0090	58,400 11.6800	21,600 4.3200		
	JOx	Journal Article Processing	12,000 Resumes	19,200 1.6000	1,920 0.1600			480 0.0400	,760 1467	23,360 1.9467	8,640 0.7200		
	Cxx	Acquisitions Data to File	30,000 Records	630 0.0210	63 0.0021	1,850 0.0617	1,350 0.0450	24 0.0008	69 0023	3,986 0.1329	1,474 0.0491	540 0.0180	
OUTPUTS	Yxx	Linotron Tapes (incl. CPC)	90 Tape Reels	45 0.5000	5 0.0556		3,150 35.0000		260 8889	3,460 38.4445	1,280 14.2222	1,260 14.0000	
	Kxx	MDS Tapes (Contract Only)	600 Tape Reels	1,800 3.0000	180 0.3000		5,100 8.5000		191 3183	7,271 12.1183	2,689 4.4817	2,040 3.4000	
	Txx Hxx	Computer Pages	39,000 Pages	390 0.0100	39 0.0001		13,650 0.3500		915 .0235	14,994 0.3845	5,546 0.1422	5,460 0.1400	
	Wxx	Photocomposed Pages	8,000 Pages	800 0.1000	80 0.0100		3,600 0.4500		6,149 .7686	10,629 1.3286	3,931 0.4914	1,440 0.1800	
	Uxx	Computer-Onto Microfilm Pages	9,000 Pages	90 0.0100	9 0.0010		2,700 0.3000		5,172 .5747	7,971 0.8857	2,949 0.3276	1,080 0.1200	
	Mxx Nxx	Pages Reproduced	1,800.000 1,000 Pages	1,800 1.0000	180 0.1000			41,400 23.0000	420 .2333	43,800 24.3333	16,200 9.0000		
	Gxx	Accessions to EDRS	20,000 Resumes	2,600 0.1300	260 0.0130			20 0.0010	40 .0020	2,920 0.1460	1,080 0.0540		
SPECIALS	E99	Special Services		3,500	350			300	230	4,380	1,620		
	Exx	Manifold System Test		2,180	218		3,750		57	6,205	2,295	1,500	

EFF-5.1 (11/70)

				1.3333	10.0000
34,000	10,200	44,200	6,80	6,800	51,000
180,000	54,000	234,000	36.00	36.000	270,000
9.0000	2.7000	11.7000	1.800	1.8000	13.5000
100,000	30,000	130,000	20,00	20,000	150,000
6.6667	2.0000	8.6567	1.333	1.3333	10.0000
80,000	24,000	104,000	16,00	16,000	120,000
16.0000	4.8000	20.8000	3.200	3.2000	24.0000
32,000	9,600	41,600	6,40	6,400	48,000
2.6667	0.8000	3.4667	0.533	0.5333	4.0000
6,000	1,800	7,800	1,20	1,200	9,000
0.2000	0.0600	0.2600	0.04	0.0400	0.3000
6,000	1,800	7,800	1,2	1,200	9,000
66.6667	20.0000	86.6667	13.33	13.3333	100.0000
12,000	3,600	15,600	2,4	2,400	18,000
20.0000	6.0000	26.0000	4.00	4.0000	30.0000
26,000	7,800	33,800	5,2	5.200	39,000
0.6667	0.2000	0.8667	0.13	0.1333	1.0000
16,000	4,800	20,800	3,2	3,200	24,000
2.0000	0.6000	2.6000	0.40	0.4000	3.0000
12,000	3,600	15,600	2,4	2,400	18,000
1.3333	0.4000	1.7333	0.26	0.2667	2.0000
60,000	18,000	78,000	12,0	12,000	90,000
33.3333	10.0000	43.3333	6.66	6.6667	50.0000
4,000	1,200	5,200	8	800	6,000
0.2000	0.0600	0.2600	0.04	0.0400	0.3000
6,000	1,800	7,800	1,4	1,200	9,000
10,000	3,000	13,000	2,	2,000	15,000

LS&R

sensitive products immediately below, i.e. Reference Request Processing (L5x), Descriptors to File (Dxx), and Source Codes to File (Sxx), respectively. This separation of "fixed" and volume sensitive costs permits more accurate assessment of the impact of changes in volume, while the transfers allow the inclusion of all costs for the respective operations in a single total for each.

7. **General and Administrative** — G&A costs (Column M) are shown at actual.

8. **Fee** — Fee is shown at % of the subtotal of Direct Costs and G&A.

9. **Quantities** — Quantity Produced (Column A) figures are from the Year-to-Date column of the Weekly Report of Operations for the corresponding period. The Quantity Produced figure for Product 640 (Pages Reproduced) is shown as 1000's of Pages to provide more manageable unit costs.

10. **Unit Costs** — Where a line is divided into shaded and unshaded portions, the figures in the shaded portion are the Year-to-Date costs for the cost element and product and the unshaded portion are the unit costs which are obtained by dividing the dollars in the shaded portion by the number of units in the Quantity Produced & Units column (Column A) for that product. The unit cost is carried to four decimal places to permit display of unit costs which may be quite small for some cost elements of some products, and to simplify rounding. It is not to be considered an indication of accuracy.

11. **Report Resumes, ALL** — This line is a subtotal of the two following lines which distinguish respectively, between resumes for which the Facility is responsible only for editing and machine input, Regular (ROx), and those for which the Facility provides Full Processing, (R5x), i.e. cataloging, indexing, abstracting. These latter include QAD's, IBE input, acquisitioned documents not assigned to clearinghouses, etc. It should be noted that after the resume edit step, this material is mingled with other input for keying, computer update, printout edit, and Master Data Set update, so that the unit cost shown cannot reflect true total processing cost for these items. A more appropriate unit cost for these items would, therefore, be the Full Processing unit cost plus the Regular unit cost. This is not the unit cost shown the Report Resumes, ALL, but the sum of the two detail unit costs.

12. **Functional Unit Costs** — A Breakdown of Direct Labor costs by function for the major input products only is presented in Sheet 2 of the report.

13. **Unit Cost Comparisons** — A comparison of unit costs as reported for each period of the current contract year is presented in Sheet 3. The period labelled December covers the period from November 16, 1970 through December 31, 1970.

DEMONSTRATION COPY

THIS REPORT HAS BEEN PREPARED FOR DEMONSTRATION PURPOSES ONLY AND BEARS NO DIRECT RELATION TO ACTUAL COSTS OF THE ERIC FACILITY

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UC FORM 1

NASA FACILITY UNIT COST REPORT--Product Unit Costs
SECTION A - INCENTIVE UNIT COSTS

Product	Costs Recorded	Government Furnished Material [1]	Total Costs	Units Produced [2]	Units	Unit Costs Actual	Unit Costs Target [3]
1. STAR Journals (Issues 20-24, & 1-13)	$385,386	$1,826	$387,212	20,688	Accessions	$18.72	$21.73
2. CSTAR Journals (Issues 19-24, & 1-13) Includes Secret Supp.	$232,337	$1,107	$233,444	11,311	Accessions	$20.64	$24.76
3. Document Requests	$166,517	$ 596	$167,113	256,335	Requests Assigned	$ 0.652	$ 0.810
4. Hard Copy Reproduction (Microfiche Blowback only)	$213,443	$6,400	$219,833	7,519,338	1000 Pages	$29.24	$36.08
5. Microfiche Masters	$120,884	$3,299	$124,183	65,941	Each	$ 1.88	$ 1.95
6. Microfiche Distribution Copies	$426,404	$5,270	$431,674	5,562,770	Each	$ 0.078	$ 0.095

[1] See Details on following page.

[2] See Note B.3

[3] See Note B.4

UC FORM 3

NASA FACILITY UNIT COST REPORT-- Direct Costs

Product or Service	Direct Labor	Overtime Premium	EDP Rental	Materials & Supplies	Other Direct	SUMMARY Total Direct
1. Total Costs [1]	$1,812,543	$19,758	$336,580	$551,934	$205,239	$2,926,054
2. Accessions General (Schedule A)	176,476	1,349	2,524	19,513	10,230	210,092
3. STAR Journals (Schedule B)	178,258	5,273	28,914	-	117	212,562
4. CSTAR Journals (Schedule C)	101,856	2,384	16,586	-	4	120,830
5. Limited Publications (SAB & PAR) (Schedule D)	15,993	411	4,083	-	5	20,492
6. Unpublished Accessions (80K & 90K) (Schedule E)	34,968	103	1,445	-	1,925	38,441
7. Service Processing (FS, TB, IAA, etc.) (Schedule F)	69,077	763	17,459	268	2,442	90,009
8. Document Service (Schedule G)	143,121	2,162	-	103,068	42,681	291,032
9. Selective Dissemination of Information (Schedule H)	37,222	565	29,300	9,455	3,313	79,855
10. Computer Files Maintenance (Schedule J)	35,832	341	52,062	4,845	71	93,151
11. Systems and Programming (Schedule K)	109,646	148	42,116	80	3,371	155,361
12. Reporting and Service to NASA (Schedule L)	70,700	84	5,557	385	2,222	78,948
13. Special Projects (Schedule M)	-	-	-	-	-	-
14. Decentralized Search System (Schedule N)	3,572	39	13,210	468	892	18,181
15. Reference Services (Schedule P)	73,139	613	69,285	2,495	432	145,964
16. Administration and Management (Schedule R)	486,988	576	4,874	137,445	96,166	726,049
17. Special Indexing (Schedule S)	15,610	770	4,934	676	16	22,006
18. Building Operations (Schedule T)	52,913	215	-	34,842	26,686	114,656
19. Microfiche Production and Distribution (Schedule U)	132,549	3,185	463	214,622	5,303	356,122
20. Bethesda Charges (Schedule Y)	74,623	777	43,768	23,772	9,363	152,303

[1] See Note D.4

UC FORM 4

NASA FACILITY UNIT COST REPORT--Indirect, Allocated, and Total Costs

Product or Service	Total Direct	Overhead @ 8.4458%	Bethesda Charges	Allocated Costs	G & A @ 23.4732%	SUMMARY Total Costs
1. Total Costs [1]	$2,926,054	$207,630	$ -	$ -	$735,576	$3,869,260
2. Accessions General (Schedule A)	210,092	14,905	18,652	15,518	60,835	320,002
3. STAR Journals (Schedule B)	212,562	15,055	-	151,963	89,099	468,679
4. CSTAR Journals (Schedule C)	120,830	8,603	18	86,830	50,768	267,049
5. Limited Publications (SAB & PAR) (Schedule D)	20,492	1,351	187	13,635	8,372	44,037
6. Unpublished Accessions (80K & 90K) (Schedule E)	38,441	2,953	-	26,872	16,024	84,290
7. Service Processing (FS, TB, IAA, etc.) (Schedule F)	90,009	5,834	18,935	40,446	36,436	191,660
8. Document Service (Schedule G)	291,032	12,088	159	83,429	90,773	477,481
9. Selective Dissemination of Information (Schedule H)	79,855	3,144	25,543	21,698	30,571	160,811
10. Computer Files Maintenance (Schedule J)	93,151	3,026	819	20,887	27,671	145,554
11. Systems and Programming (Schedule K)	155,361	9,260	107,885	63,915	78,969	415,390
12. Reporting and Service to NASA (Schedule L)	78,948	5,971	18,786	41,213	34,017	178,935
13. Special Projects (Schedule M)	-	-	1,214	-	285	1,499
14. Decentralized Search System (Schedule N)	18,181	302	23,886	2,082	10,434	54,885
15. Reference Services (Schedule P)	145,964	6,177	30,875	43,501	53,171	279,688
16. Administration and Management (Schedule R)	726,049	41,130	4,753	(771,932)	-	-
17. Special Indexing (Schedule S)	22,006	1,318	-	9,099	7,611	40,034
18. Building Operations (Schedule T)	114,656	4,469	3,952	30,844	36,130	190,051
19. Microfiche Production and Distribution (Schedule U)	356,122	11,195	222	77,266	104,410	549,215
20. Bethesda Charges (Schedule Y)	152,303	60,849	(255,886)	42,734	-	-

[1] See Note D.4

UC FORM 5

NASA FACILITY UNIT COST REPORT--Allocation Detail

SUMMARY

Product or Service	Management Allocation [1]	Accessions Allocation [2]	Issues Allocation [3]	Total Allocations
1. Total Costs	$ -	$ -	$ -	$ -
2. Accessions General (Schedule A)	102,872	(61,431)	(25,923)	15,518
3. STAR Journals (Schedule B)	103,911	33,076	14,976	151,963
4. CSTAR Journals (Schedule C)	59,374	18,899	8,557	86,830
5. Limited Publications (SAB & PAR) (Schedule D)	9,323	2,968	1,344	13,635
6. Unpublished Accessions (80K & 90K) (Schedule E)	20,384	6,488	-	26,872
7. Service Processing (FS, TB, IAA, etc.) (Schedule F)	40,267	-	179	40,446
8. Document Service (Schedule G)	83,429	-	-	83,429
9. Selective Dissemination of Information (Schedule H)	21,698	-	-	21,698
10. Computer Files Maintenance (Schedule J)	20,887	-	-	20,887
11. Systems and Programming (Schedule K)	63,915	-	-	63,915
12. Reporting and Service to NASA (Schedule L)	41,213	-	-	41,213
13. Special Projects (Schedule M)	-	-	-	-
14. Decentralized Search System (Schedule N)	2,082	-	-	2,082
15. Reference Services (Schedule P)	42,634	-	867	43,501
16. Administration and Management (Schedule R)	(771,932)	-	-	(771,932)
17. Special Indexing (Schedule S)	9,099	-	-	9,099
18. Building Operations (Schedule T)	30,844	-	-	30,844
19. Microfiche Production and Distribution (Schedule U)	77,266	-	-	77,266
20. Bethesda Charges (Schedule Y)	42,734	-	-	42,734

[1]See Note D.3.a [2]See Note D.3.b [3]See Note D.3.c

UC FORM 3

NASA FACILITY UNIT COST REPORT-- Direct Costs

Schedule B
STAR JOURNALS

Product or Service	Direct Labor	Overtime Premium	EDP Rental	Materials & Supplies	Other Direct	Total Direct
1. Total	$178,258	$5,273	$28,914	-	$117	$212,562
2. Carryover [1]	7,872	174	453	-	-	8,499
3. Completed STAR Issues (B01) [1]	150,396	4,562	16,132	-	117	171,207
4. Issues in Process [1]	13,740	154	1,295	-	-	15,189
5. STAR Cumulative Indexes (B50)	6,250	383	11,034	-	-	17,667

Schedule C
CSTAR JOURNALS

1. Total	$101,856	$2,384	$16,586	-	$ 4	$120,830
2. Carryover [1]	3,642	65	216	-	-	3,923
3. Completed CSTAR Issues (C01) [1]	91,254	2,075	9,317	-	4	102,650
4. Issues in Process [1]	3,240	8	167	-	-	3,415
5. CSTAR Cumulative Indexes (C50)	3,720	236	6,886	-	-	10,842

[1]See Note A.7

UC FORM 4 NASA FACILITY UNIT COST REPORT--Indirect, Allocated, and Total Costs

Product or Service	Total Direct	Overhead @ 8.4458%	Bethesda Charges	Allocated Costs [1]	G & A @ 23.4732%	Schedule B STAR JOURNALS Total Costs
1. Total	$212,562	$15,055	-	$151,963	$89,099	$468,679
2. Carryover [2]	8,499	665	-	6,711	3,726	19,601
3. Completed STAR Issues (B01) [2]	171,207	12,702	-	128,212	73,265	385,386
4. Issues in Process [2]	15,189	1,160	-	11,712	6,587	34,648
5. STAR Cumulative Indexes (B50)	17,667	528	-	5,328	5,521	29,044

						Schedule C CSTAR JOURNALS
1. Total	$120,830	$ 8,603	$18	$ 86,830	$50,768	$267,049
2. Carryover [2]	3,923	308	-	3,105	1,722	9,058
3. Completed CSTAR Issues (C01) [2]	102,650	7,707	18	77,793	44,169	232,337
4. Issues in Process [2]	3,415	274	-	2,762	1,514	7,965
5. CSTAR Cumulative Indexes (C50)	10,842	314	-	3,170	3,363	17,689

[1] See Details on following page

[2] See Note A.7

UC FORM 5 NASA FACILITY UNIT COST REPORT--Allocation Detail

Schedule B
STAR JOURNALS

Product or Service	Management Allocation[1]	Accessions Allocation[2]	Issues Allocation[3]	Total Allocations
1. Total	$103,911	$33,076	$14,976	$151,963
2. Carryover[4]	4,589	1,461	661	6,711
3. Completed STAR Issues (B01)[4]	87,670	27,906	12,636	128,212
4. Issues in Process[4]	8,009	2,549	1,154	11,712
5. STAR Cumulative Indexes (B50)	3,643	1,160	525	5,328

Schedule C
CSTAR JOURNALS

1. Total	$ 59,374	$18,899	$ 8,557	$ 86,830
2. Carryover[4]	2,123	676	306	3,105
3. Completed CSTAR Issues (C01)[4]	53,194	16,932	7,667	77,793
4. Issues in Process[4]	1,889	601	272	2,762
5. CSTAR Cumulative Indexes (C50)	2,168	690	312	3,170

[1]See Note D.3.a

[2]See Note D.3.b

[3]See Note D.3.c

[4]See Note A.7

NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY
Unit Cost Report (CPIF)

Product Description	Product Costs					G&A Costs At Actual	Grand Total Costs
	Labor	Non-Product Direct	Material	Other Charges	Total		
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
1. Accessions to File	$375,000.00	$375,000.00	$20,000.00	$230,000.00	$1,000,000.00	$250,000.00	$1,250,000.00
2. Abstracts Announced	125,000.00	125,000.00	3,000.00	107,000.00	360,000.00	90,000.00	450,000.00
3. IAA Input - Reels Updated	--	--	--	8,000.00	8,000.00	2,000.00	10,000.00
4. Grace Pages	1,000.00	1,000.00		18,000.00	20,000.00	5,000.00	25,000.00
5. Computer Produced Pages -Camera Ready	5,000.00	5,000.00	1,000.00	29,000.00	40,000.00	10,000.00	50,000.00
6. Computer Produced Pages - Listings	1,000.00	1,000.00		10,000.00	12,000.00	3,000.00	15,000.00
7. Other Composed Pages	5,000.00	5,000.00	1,000.00	5,000.00	16,000.00	4,000.00	20,000.00
8. Microfiche Masters - Facility Produced	30,000.00	30,000.00	10,000.00	10,000.00	80,000.00	20,000.00	100,000.00
9. Microfiche Masters - Conversions	9,000.00	9,000.00	1,000.00	1,000.00	20,000.00	5,000.00	25,000.00
10. Microfiche Distribution Copies	100,000.00	100,000.00	240,000.00	40,000.00	480,000.00	120,000.00	600,000.00
11. SDI (Profiles X Accessions)	20,000.00	20,000.00	10,000.00	50,000.00	100,000.00	25,000.00	125,000.00
12. SCAN (Topics X Accessions)	10,000.00	10,000.00	1,000.00	3,000.00	24,000.00	6,000.00	30,000.00
13. Literature Searches - Machine	30,000.00	30,000.00	5,000.00	55,000.00	120,000.00	30,000.00	150,000.00
14. Requests Processed - Standard	100,000.00	100,000.00	10,000.00	30,000.00	240,000.00	60,000.00	300,000.00
15. Requests Processed - Non-Standard	45,000.00	45,000.00	1,000.00	5,000.00	96,000.00	24,000.00	120,000.00
16. Document Page Reproduction	50,000.00	50,000.00	70,000.00	190,000.00	360,000.00	90,000.00	450,000.00
17. Tapes Duplicated	1,000.00	1,000.00	1,000.00	17,000.00	20,000.00	5,000.00	25,000.00
18. Accession Cards - CSTAR and SAB	1,000.00	1,000.00	1,000.00	5,000.00	8,000.00	2,000.00	10,000.00
19. Abstract Cards - IAA	3,000.00	3,000.00	3,000.00	15,000.00	24,000.00	6,000.00	30,000.00
20. Abstract Cards - STAR	5,000.00	5,000.00	4,000.00	22,000.00	36,000.00	9,000.00	45,000.00
21. NASA Tech Briefs - Reviewed	35,000.00	35,000.00	1,000.00	1,000.00	72,000.00	18,000.00	90,000.00
22. NASA Tech Briefs - Composed	13,000.00	13,000.00	1,000.00	13,000.00	40,000.00	10,000.00	50,000.00
23. MAA Maintenance Transactions Updated	15,000.00	15,000.00	1,000.00	9,000.00	40,000.00	10,000.00	50,000.00
24. Specification Standards - Items In	2,000.00	2,000.00	--	--	4,000.00	1,000.00	5,000.00
25. Special Indexing - Input Pages	10,000.00	10,000.00	1,000.00	3,000.00	24,000.00	6,000.00	30,000.00
26. Thesaurus Keypunching - Cards Punched	--	--	--	12,000.00	12,000.00	3,000.00	15,000.00
Regular Production Costs	991,000.00	991,000.00	386,000.00	888,000.00	3,256,000.00	814,000.00	4,070,000.00
Other Production Costs (a)	9,000.00	9,000.00	4,000.00	2,000.00	24,000.00	6,000.00	30,000.00
Grand Total Costs (CPIF) (b)	$1,000,000.00	$1,000,000.00	$390,000.00	$890,000.00	$3,280,000.00	$820,000.00	$4,100,000.00

(a) includes Overlap Study and the Computer Utilization for Thesaurus
(b) CPIF - Cost Plus Incentive Fee

NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY
Unit Cost Report (CPIF)

Product Description	Unit of Measure-ment	Grand Total Cost	Units Completed			Work in Process	
			Number	Cost	Cost Per Unit	Equivalent Units	Value
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
. Accessions to File	Each	$1,250,000.00	99,000	$1,237,500.00	12.5000	1,000	$12,500.00
. Abstracts Announced	Each	450,000.00	43,500	435,000.00	10.0000	1,500	15,000.00
. IAA Input-Reels Updated	Each	10,000.00	25	10,000.00	400.0000	--	--
. GRACE Pages	Each	25,000.00	10,000	25,000.00	2.5000	--	--
. Computer Produced Pages - Camera Ready	Each	50,000.00	24,000	48,000.00	2.0000	1,000	2,000.00
. Computer Produced Pages - Listings	Each	15,000.00	30,000	15,000.00	0.5000	--	--
. Other Composed Pages	Each	20,000.00	1,990	19,900.00	10.0000	10	100.00
. Microfiche Masters - Facility Produced	Each	100,000.00	24,500	98,000.00	4.0000	500	2,000.00
. Microfiche Masters - Conversions	Each	25,000.00	24,000	24,000.00	1.0000	1,000	1,000.00
. Microfiche Distribution Copies	Each	600,000.00	5,850,000	585,000.00	0.1000	150,000	15,000.00
. SDI (Profiles X Accessions)	$1,000.00	125,000.00	49,600	124,000.00	2.5000	400	1,000.00
. SCAN (Topics X Accessions)	1,000.00	30,000.00	14,900	29,800.00	2.0000	100	200.00
. Literature Searches - Machine	Each	150,000.00	2,900	145,000.00	50.0000	100	5,000.00
. Requests Processed - Standard	Each	300,000.00	297,000	297,000.00	1.0000	3,000	3,000.00
. Requests Processed - Non-std.-Surcharge	Each	120,000.00	78,000	117,000.00	1.5000	2,000	3,000.00
. Document Page Reproduction	1,000.00	450,000.00	14,970	449,100.00	30.0000	30	900.00
. Tapes Duplicated	Each	25,000.00	1,000	25,000.00	25.0000	--	--
. Accession Cards - CSTAR and SAB	Titles	10,000.00	20,000	10,000.00	0.5000	--	--
. Abstract Cards - IAA	Titles	30,000.00	29,000	29,000.00	1.0000	1,000	1,000.00
. Abstract Cards - STAR	Titles	45,000.00	30,000	45,000.00	1.5000	--	--
. NASA Tech Briefs - Reviewed	Each	90,000.00	1,180	88,500.00	75.0000	20	1,500.00
. NASA Tech Briefs - Composed	Each	50,000.00	990	49,500.00	50.0000	10	500.00
. MAA Maintenance - Transactions Updated	Each	50,000.00	49,500	49,500.00	1.0000	500	500.00
. Specification Standards - Items In	Each	5,000.00	1,000	5,000.00	5.0000	--	--
. Special Indexing - Input Pages	Each	30,000.00	3,000	30,000.00	10.0000	--	--
. Thesaurus Keypunching - Cards Punched	Each	15,000.00	98,000	14,700.00	0.1500	2,000	300.00
Regular Production Costs (a)		4,070,000.00		4,005,500.00			64,500.00
Other Production Costs (b)		30,000.00		30,000.00			--
Grand Total Costs (CPIF) (c)		$4,100,000.00		$4,035,500.00			$64,500.00

a) Standard Unit Cost ($1.0000) plus Non-Standard-Surcharge Unit Cost ($1.5000) = $2.5000 = Total Non-Standard Unit Cost.
b) Includes Overlap Study, and the Computer Utilization for Thesaurus.
c) CPIF - Cost Plus Incentive Fee.

APPENDIX H

Typical Product Numbering Scheme

ERIC FACILITY

Charge Number Guide

SCHEDULE SUMMARY

Schedule	Description	Coverage
A	Management & Administration	Management, Reporting, Documentation & Special Tasks
B	Systems & Programming	Maintenance, Operations, & Special Projects
C	Clearinghouse Acquisitions Data Input	
D	Descriptors to File	DJF Processing, PET, Maintenance
E	Extra Tasks	Unprogrammed effort
G	Documents/SFR to EDRS	Includes Microfiche filing by Issue
H	Single Frame Resume Preparation	Computer Runs only, excludes Printing and Schedule G activities
J	Journal Article Resume Preparation	Includes journal subscriptions (J99)
K	Tape Duplications	By Type. K99 for Project 506 only
L	Reference Library Activities	Requests, EDRS, General, & Special
M	Printing & Duplication (Part I)	By Publication, by Issue
N	Printing & Duplication (Part II)	By Publication, by Issue
P	Acquisitions Program	
R	Report Resumes to File	RIE - Regular, & Full Processing
S	Source Codes/Names to File	By Issue, Maintenance
T	Publications Copy - Chain Printer	By Publication, by Issue
U	Publications Copy - COM	By Publication, by Issue
W	Publications Copy - Photocomposition	By Publication, by Issue
Y	Publications Copy - Linotron Tape	RIE Issues, Cumulatives, Manpower, Pacesetters

ERIC PRODUCT NUMBERS

SCHEDULE B

Systems & Programming

B01 Systems Maintenance

B10 Operations

B21 SIE Conversion
B22 Prepare Frequency Distribution Report
B23 Integrate CIJE into Data Base

ERIC PRODUCT NUMBERS
Descriptors to File

D01 Descriptors to File - January Issue
D02 Descriptors to File - February Issue
D03 Descriptors to File - March Issue
D04 Descriptors to File - April Issue
D05 Descriptors to File - May Issue
D06 Descriptors to File - June Issue
D07 Descriptors to File - July Issue
D08 Descriptors to File - August Issue
D09 Descriptors to File - September Issue
D10 Descriptors to File - October Issue
D11 Descriptors to File - November Issue
D12 Descriptors to File - December Issue

D20 PET (Panel on Educational Terminology)

D50 Thesaurus Maintenance *

ERIC PRODUCT NUMBERS
Journal Article Resumes To File

SCHEDULE J

J01 Journal Article Resumes to File - January
J02 Journal Article Resumes to File - February
J03 Journal Article Resumes to File - March
J04 Journal Article Resumes to File - April
J05 Journal Article Resumes to File - May
J06 Journal Article Resumes to File - June
J07 Journal Article Resumes to File - July
J08 Journal Article Resumes to File - August
J09 Journal Article Resumes to File - September
J10 Journal Article Resumes to File - October
J11 Journal Article Resumes to File - November
J12 Journal Article Resumes to File - December

J99 Journal Articles General *

ERIC PRODUCT NUMBERS
Reference Activities

L01 Special Tasks

L51 Reference Request Processing *
L52 EDRS Identifications *

L99 Reference, General *

ERIC PRODUCT NUMBERS
Printing & Duplication

SCHEDULE M

M01 Thesaurus - January Issue
M02 Thesaurus - February Issue
M03 Thesaurus - March Issue
M04 Thesaurus - April Issue
M05 Thesaurus - May Issue
M06 Thesaurus - June Issue
M07 Thesaurus - July Issue
M08 Thesaurus - August Issue
M09 Thesaurus - September Issue
M10 Thesaurus - October Issue
M11 Thesaurus - November Issue
M12 Thesaurus - December Issue

M13 Rotated Descriptor Display
M14 Descriptor Usage Postings & Statistics
M15 Identifier Usage Postings Statistics

M21 Source Directory - January Issue
M22 Source Directory - February Issue
M23 Source Directory - March Issue
M24 Source Directory - April Issue
M25 Source Directory - May Issue
M26 Source Directory - June Issue
M27 Source Directory - July Issue
M28 Source Directory - August Issue
M29 Source Directory - September Issue
M30 Source Directory - October Issue
M31 Source Directory - November Issue
M32 Source Directory - December Issue

M41 CH/ED XREF - January Issue
M42 CH/ED XREF - February Issue
M43 CH/ED XREF - March Issue
M44 CH/ED XREF - April Issue
M45 CH/ED XREF - May Issue
M46 CH/ED XREF - June Issue
M47 CH/ED XREF - July Issue
M48 CH/ED XREF - August Issue
M49 CH/ED XREF - September Issue
M50 CH/ED XREF - October Issue
M51 CH/ED XREF - November Issue
M52 CH/ED XREF - December Issue

M61 Acquisitions Data Report - January Issue
M62 Acquisitions Data Report - February Issue
M63 Acquisitions Data Report - March Issue
M64 Acquisitions Data Report - April Issue
M65 Acquisitions Data Report - May Issue
M66 Acquisitions Data Report - June Issue
M67 Acquisitions Data Report - July Issue
M68 Acquisitions Data Report - August Issue
M69 Acquisitions Data Report - September Issue
M70 Acquisitions Data Report - October Issue
M71 Acquisitions Data Report - November Issue
M72 Acquisitions Data Report - December Issue

M81 Bureau No. Index - January Issue
M82 Bureau No. Index - February Issue
M83 Bureau No. Index - March Issue
M84 Bureau No. Index - April Issue
M85 Bureau No. Index - May Issue
M86 Bureau No. Index - June Issue
M87 Bureau No. Index - July Issue
M88 Bureau No. Index - August Issue
M89 Bureau No. Index - September Issue
M90 Bureau No. Index - October Issue
M91 Bureau No. Index - November Issue
M92 Bureau No. Index - December Issue

ERIC PRODUCT NUMBERS
Report Resumes to File

R01 RIE Regular - January Issue
R02 RIE Regular - February Issue
R03 RIE Regular - March Issue
R04 RIE Regular - April Issue
R05 RIE Regular - May Issue
R06 RIE Regular - June Issue
R07 RIE Regular - July Issue
R08 RIE Regular - August Issue
R09 RIE Regular - September Issue
R10 RIE Regular - October Issue
R11 RIE Regular - November Issue
R12 RIE Regular - December Issue

R51 RIE Full Processing - January Issue
R52 RIE Full Processing - February Issue
R53 RIE Full Processing - March Issue
R54 RIE Full Processing - April Issue
R55 RIE Full Processing - May Issue
R56 RIE Full Processing - June Issue
R57 RIE Full Processing - July Issue
R58 RIE Full Processing - August Issue
R59 RIE Full Processing - September Issue
R60 RIE Full Processing - October Issue
R61 RIE Full Processing - November Issue
R62 RIE Full Processing - December Issue

R99 Report Resumes, General*

ERIC PRODUCT NUMBERS
Publications Copy-Chain Printer

SCHEDULE T

T01 Thesaurus - January Issue
T02 Thesaurus - February Issue
T03 Thesaurus - March Issue
T04 Thesaurus - April Issue
T05 Thesaurus - May Issue
T06 Thesaurus - June Issue
T07 Thesaurus - July Issue
T08 Thesaurus - August Issue
T09 Thesaurus - September Issue
T10 Thesaurus - October Issue
T11 Thesaurus - November Issue
T12 Thesaurus - December Issue
T13 Rotated Descriptor Display
T14 Descriptor Usage Postings
T15 Descriptor Usage Postings Statistics
T16 Identifier Usage Postings
T17 Identifier Usage Postings Statistics

T21 Source Directory - January Issue
T22 Source Directory - February Issue
T23 Source Directory - March Issue
T24 Source Directory - April Issue
T25 Source Directory - May Issue
T26 Source Directory - June Issue
T27 Source Directory - July Issue
T28 Source Directory - August Issue
T29 Source Directory - September Issue
T30 Source Directory - October Issue
T31 Source Directory - November Issue
T32 Source Directory - December Issue
T33 Source Directory Usage Postings
T34 Source Directory Usage Postings Statistics

T41 CH/ED XREF - January Issue
T42 CH/ED XREF - February Issue
T43 CH/ED XREF - March Issue
T44 CH/ED XREF - April Issue
T45 CH/ED XREF - May Issue
T46 CH/ED XREF - June Issue
T47 CH/ED XREF - July Issue
T48 CH/ED XREF - August Issue
T49 CH/ED XREF - September Issue
T50 CH/ED XREF - October Issue
T51 CH/ED XREF - November Issue
T52 CH/ED XREF - December Issue

T61 Report No. Index - January Issue
T62 Report No. Index - February Issue
T63 Report No. Index - March Issue
T64 Report No. Index - April Issue
T65 Report No. Index - May Issue
T66 Report No. Index - June Issue
T67 Report No. Index - July Issue
T68 Report No. Index - August Issue
T69 Report No. Index - September Issue
T70 Report No. Index - October Issue
T71 Report No. Index - November Issue
T72 Report No. Index - December Issue

T81 Bureau No. Index - January Issue
T82 Bureau No. Index - February Issue
T83 Bureau No. Index - March Issue
T84 Bureau No. Index - April Issue
T85 Bureau No. Index - May Issue
T86 Bureau No. Index - June Issue
T87 Bureau No. Index - July Issue
T88 Bureau No. Index - August Issue
T89 Bureau No. Index - September Issue
T90 Bureau No. Index - October Issue
T91 Bureau No. Index - November Issue
T92 Bureau No. Index - December Issue

ERIC PRODUCT NUMBERS
Publications Copy- C.O.M.

U01 Thesaurus - January Issue
U02 Thesaurus - February Issue
U03 Thesaurus - March Issue
U04 Thesaurus - April Issue
U05 Thesaurus - May Issue
U06 Thesaurus - June Issue
U07 Thesaurus - July Issue
U08 Thesaurus - August Issue
U09 Thesaurus - September Issue
U10 Thesaurus - October Issue
U11 Thesaurus - November Issue
U12 Thesaurus - December Issue
U13 Rotated Descriptor Display

U21 Source Directory - January Issue
U22 Source Directory - February Issue
U23 Source Directory - March Issue
U24 Source Directory - April Issue
U25 Source Directory - May Issue
U26 Source Directory - June Issue
U27 Source Directory - July Issue
U28 Source Directory - August Issue
U29 Source Directory - September Issue
U30 Source Directory - October Issue
U31 Source Directory - November Issue
U32 Source Directory - December Issue

ERIC PRODUCT NUMBERS
Publications Copy-Photocomposition

W01 Thesaurus - January Issue
W02 Thesaurus - February Issue
W03 Thesaurus - March Issue
W04 Thesaurus - April Issue
W05 Thesaurus - May Issue
W06 Thesaurus - June Issue
W07 Thesaurus - July Issue
W08 Thesaurus - August Issue
W09 Thesaurus - September Issue
W10 Thesaurus - October Issue
W11 Thesaurus - November Issue
W12 Thesaurus - December Issue
W13 Rotated Descriptor Display

ERIC PRODUCT NUMBERS
Publication Copy-Tape

Y01 RIE - January Issue
Y02 RIE - February Issue
Y03 RIE - March Issue
Y04 RIE - April Issue
Y05 RIE - May Issue
Y06 RIE - June Issue
Y07 RIE - July Issue
Y08 RIE - August Issue
Y09 RIE - September Issue
Y10 RIE - October Issue
Y11 RIE - November Issue
Y12 RIE - December Issue

Y26 RIE Semi-Annual Cumulative

Y32 RIE Annual Cumulative

APPENDIX J

Typical Functional Unit Cost Report Formats

ERIC FACILITY COST REPORT

DIRECT LABOR FUNCTIONAL BREAKDOWN

SHEET 2

For the Period

Mat.	Description	A Production Quantity	B Document Preparation (2B)	C Document Input (2D)	D Editing (2E)	E Printing (2F)	F Duplicate Checking (2G)	G Keying and Verifying (4A)	H Document Output (4B)	I Total Direct Labor
			$23,425	$8,874	$24,434	$18,847	$22,423.5	$18,847	$22,282	N/A
			Direct Labor Premium	Overtime	Overhead @ 8.4658	G & A				
M	Reports Process, Misc. Mtls. Mtls.	20,000	0.1500	2.1250	0.1250	0.2375	0.1875	0.2375	0.4000	3.4625
M	Report Resumes, Report Only	15,000	0.0375	2.1250	0.1250	0.2375	0.1875	0.2375	0.4000	3.3500
M	Report Resumes, Indexes	15,000	0.0500	2.1250	0.1250	0.2375	0.1875	0.2375	0.4000	3.3625
M		5,000	0.0500	2.1250	0.1250	0.2375	0.1875	0.2375	0.4000	3.3625
				9,000	0.6000	0.4500	0.3000	0.4500	0.7500	6.4500

UC FORM 2

NASA FACILITY UNIT COST REPORT--Costs By Function
STAR JOURNALS *

Functions	Direct Labor	Overtime Premium	Overhead @8.4458 %	G & A @23.4732%	Total Cost	Unit Cost/
1. Total	$150,395	$4,562	$12,702	$39,355	$207,014	$10.006
2. Accessioning (319)	3,683	122	311	966	5,082	0.246
3. Categorizing (311)	4,225	-	357	1,076	5,658	0.273
4. Cataloging (310)	15,282	71	1,291	3,907	20,551	0.993
5. Abstracting (313)	20,393	227	1,722	5,244	27,586	1.333
6. Indexing (312)	24,250	358	2,048	6,257	32,913	1.591
7. Clerical Support (303)	1,807	30	153	467	2,457	0.119
8. Keyboarding (326)	8,925	308	754	2,344	12,331	0.596
9. Operating Photocomposition Machines (346)	36,114	1,943	3,050	9,649	50,756	2.453
10. Operating EAM Equipment (343)	42	-	4	11	57	0.003
11. Operating Computers (344)	1,046	5	88	267	1,406	0.068
12. Page Make-up (328)	15,503	885	1,309	4,154	21,851	1.056
13. Proofreading (330)	12,358	403	1,044	3,241	17,046	0.824
14. Editing (331)	6,767	210	571	1,772	9,320	0.451

* Total Labor Applied to STAR Issues 20-24, and 1-13.
/ Based on 20,688 published accessions. (See Note C.2)

UC FORM 2

NASA FACILITY UNIT COST REPORT--Costs By Function
HARD COPY REPRODUCTION (MICROFICHE BLOWBACK)

Functions	Direct Labor	Overtime Premium	Overhead @8.4458 %	G & A @23.4732%	Total Cost	Unit Cost/
1. Total	$53,103	$671	$4,485	$13,675	$71,934	0.722 ea. 9.57 /M
2. Request Processing (334)	2,060	10	174	527	2,771	0.028 ea. 0.37 /M
3. Operating Microfiche Blowback Equipment (349)	27,017	371	2,282	6,964	36,634	0.368 ea. 4.87 /M
4. Inspecting (332)	15,147	175	1,279	3,897	20,498	0.206 ea. 2.73 /M
5. Bindery Operation (352)	8,765	115	740	2,258	11,878	0.119 ea. 1.58 /M
6. Clerical Support (303)	114	-	10	29	153	0.001 ea. 0.02 /M

/ Unit Costs identified by "ea." are per document reproduced and are based on 99,567 documents reproduced. (See Note C.2)
Unit Costs identified by "/M" are per 1000 document pages reproduced and are based on 7,519,338 pages reproduced. (See Note C.2)

UC FORM 2

NASA FACILITY UNIT COST REPORT--Costs By Function
GENERAL COSTS

Functions	Direct Labor	Overtime Premium	Overhead @8.4458 %	G & A @23.4732%	Total Cost	Unit Cost
1. Total	$441,972	$559	$37,328	$112,638	$592,497	N/A
2. Mgmt. & Supervision (301)	259,876	157	21,949	66,190	348,172	
3. Staff Activities (302)	17,689	-	1,494	4,503	23,686	
4. Training (304)	27,210	27	2,298	6,933	36,468	
5. Keyboarding (326)	100	4	8	26	138	
6. EDP Operations (343, etc.)	101	-	9	26	136	
7. Art & Photography (309, etc.)	547	-	46	139	732	
8. Duplication (350)	781	7	66	200	1,054	
9. Equipment Maintenance (322)	15,658	263	1,322	4,048	21,291	
10. Clerical Support (303)	67,838	101	5,729	17,292	90,960	
11. Non-Productive Time (333)	2,019	-	171	514	2,704	
12. Sick & Admin. Leave (507, 508)	50,153	-	4,236	12,767	67,156	N/A

APPENDIX K

Typical Production Reports

ERIC FACILITY WEEKLY REPORT OF OPERATIONS

FOR THE MONTH OF _____

CATEGORIES	OPERATIONS	WEEKLY COUNT WEEK OF	WEEK OF	WEEK OF	WEEK OF	WEEK OF	TOTAL	YEAR TO DATE
I. ACQUISITIONS AND DOCUMENT CONTROL	A. FACILITY ACQUISITIONS EFFORT							
	1. Acquisitions Requests Generated							
	a. Individual Documents							
	b. Automatic Distribution							
	2. Direct Receipts							
	B. CLEARINGHOUSE ACQUISITIONS DATA REPORTS							
	1. Sheets Received From Clearinghouse							
	2. Sheets Keypunched							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
	C. MICROFICHE RECEIVED FROM EDRS							
	D. DOCUMENTS ASSIGNED FOR PROCESSING							
	1. Documents Received For Assignment							
	2. Documents Logged And Assigned To Clearinghouses							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
	E. PAPER PUNCHING							
	1. Documents Transmitted For Punching							
	a. Report Resumes							
	b. Project Resumes							
	c. DJF'S							
	d. Source Names/Codes							
	e. LIDS Corrections							
	2. Documents Punched							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
	F. ERIC DATA BASE TAPE SALES							
	1. Requests For Tapes Received							
	a. Resumes							
	b. Thesaurus And Descriptor Postings							
	c. CIJE							
	2. Tape Reels Transmitted							
	a. Lessor Supplied							
	b. Customer Supplied							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
II. DOCUMENT ANALYSIS	A. RESEARCH IN EDUCATION (RIE)							
	1. Documents/Resumes Received							
	a. Regulars							
	b. Full Processing (incl. QAD's)							
	2. Documents/Resumes Processed							
	a. Regulars							
	b. Full Processing (incl. QAD's)							
	3. Processing Backlog - 3 (Previous Week) + 1 minus 2							
	4. Computer Input							
	a. LIDS Update							
	b. Reject/Hold/Duplicates							
	5. Update Backlog - 5 (Previous Week) + 2 minus 4							
	B. OTHER (Specify)							
	1. Documents/Resumes Received							
	a. New							
	b. Changes							
	2. Documents/Resumes Processed							
	a. New							
	b. Changes							
	3. Processing Backlog - 3 (Previous Week) + 1 minus 2							
	4. Computer Input							
	a. LIDS Input							
	b. Reject/Hold/Duplicates							
	5. Update Backlog - 5 (Previous Week) + 2 minus 4							
	C. OTHER (Specify)							
	1. Documents/Resumes Received							
	a. New							
	b. Changes							
	2. Documents/Resumes Processed							
	a. New							
	b. Changes							
	3. Processing Backlog - 3 (Previous Week) + 1 minus 2							
	4. Computer Input							
	a. LIDS Input							
	b. Reject/Hold/Duplicates							
	5. Update Backlog - 5 (Previous Week) + 2 minus 4							
	D. CURRENT INDEX TO JOURNALS IN EDUCATION (CIJE)							
	1. Journal Issues Received							
	a. Retained For Facility Processing							
	b. Forwarded For Clearinghouse Processing							
	2. Journal Issues Processed							
	3. Backlog - 3 (Previous Week) + 1a minus 2							
	4. Journal Article Resumes Accessioned							

ERIC FACILITY WEEKLY REPORT OF OPERATIONS

APPENDIX K
Page Two

FOR THE MONTH OF _____

CATEGORIES	OPERATIONS	WEEKLY COUNT WEEK OF	WEEK OF	WEEK OF	WEEK OF	WEEK OF	TOTAL	YEAR TO DATE
III. LEXICOGRAPHY	1. DJF'S Received							
	2. DJF'S Processed							
	a. Accepted							
	b. Edited							
	c. Rejected (Returned to Clearinghouse)							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
IV. SOURCE ANALYSIS	1. Resumes Requiring Sources Received							
	2. Resumes Processed							
	a. Accepted							
	b. Edited							
	c. Existing Codes							
	3. Backlog - 3 (Previous Week) + 1 minus 2							
V. REFERENCE ACTIVITY	1. Queries Received							
	a. Direct							
	b. From OE							
	c. From EDRS							
	d. Other							
	2. Queries Processed							
	a. Letters							
	(1) #1 (General)							
	(2) #2 (Document Reference)							
	(3) Brochures Sent							
	(4) Special Response							
	b. Forwarded to EDRS (With Identification)							
	c. Forwarded to OE (For Special Handling)							
	d. Telephone							
	3.Backlog - 3 (Previous Week) +1 minus 2							
	4. Individual Identifications Performed							
VI. PUBLICATION DELIVERIES	1. Research in Education							
	2. Thesaurus Working Copy							
	3. Source Code Directory							
	4. BR Number Cross-Reference							
	5. Report Number Cross-Reference							
	6. CH/ED Number Cross-Reference							
	7. Acquisitions Data Report							
	8. Documents and SF Resumes to EDRS							
	9. Other (Specify)							
	10.							
	11.							
	12.							
VII. PRODUCT DELIVERIES	1. Request Responces							
	2. Descriptors to File							
	a. Main Terms							
	b. Use References							
	3. Source Codes/Names to File							
	4. Report Resumes to File							
	a. Regular Only							
	b. Full Processing							
	5. Journal Articles Processed							
	6. Acquisitions Records to File							
	7. Linotron Tapes (Including CPC)							
	8. Tapes Duplicated							
	a. Master Data Set (Including CIJE)							
	b. Thesaurus							
	c. CPC							
	d. Other							
	9. Computer Printer Pages							
	10. Photocomposed Pages							
	11. COM Pages							
	12. Pages Reproduced							
	13. Single Frame Resumes to EDRS							
	14.							
	15.							
	16.							
	17.							

Notes:

1. Throughout this report, a pattern of subtotaling is observed: all lower case letters (a,b,c, etc.) are subtotaled at the arabic number (1,2,3, etc.) under which they are indented. The same pattern holds for further levels of indention.

LISTING OF TABLES AND CHARTS

I. DOCUMENTS RECEIVED

Duplicate Checking Station, Documents Received and Processed at . . . . . Table 1.1

Received at Input, and Processed by Duplicate Checking, Documents . . . . Chart 1.1

Evaluated, Titles . . . . . Table 1.2

Evaluated, Titles . . . . . Chart 1.2

Accessioned, Titles - Published Series. . . . . Table 1.3a

Accessioned, Titles - Non-published Series. . . . . Table 1.3b

Accessioned, Titles - All Series. . . . . Chart 1.3a

Accessioned, Titles - Regular Publications. . . . . Chart 1.3b

NASA Facility Cumulative File - All Accession Series. . . . . Table 1.4

II. PUBLICATIONS

Journal Analysis - STAR . . . . . Table 2.1a

Journal Analysis - CSTAR. . . . . Table 2.1b

STAR and CSTAR, Accessions Published and Pages Used . . . . . Table 2.2

STAR and CSTAR, Number of Accessions Published. . . . . Chart 2.2

SAB, PAR, RATR, Continuing Bibliographies, and Other Publications . . . . Table 2.3

III. COMPUTER USAGE-MACHINE HOURS . . . . . Table 3.1

IV. MICROFICHE AND HARD COPY PRODUCTION

Microfiche, Documents Photographed for, in the Facility . . . . . Table 4.1

Microfiche, Documents Photographed for, in the Facility . . . . . Chart 4.1

Microfiche Masters Prepared . . . . . Table 4.2

Microfiche Masters Prepared . . . . . Chart 4.2

Microfiche Titles, Cards, and Distribution Copies, Reproduced . . . . . Table 4.3

Microfiche Titles and Cards Reproduced. . . . . Chart 4.3a

Microfiche Distribution Copies Reproduced . . . . . Chart 4.3b

Microfiche Distribution, by Code. . . . . Table 4.4

Document and Page Reproduction (Hard Copy). . . . . Table 4.5

Hard Copy Documents Reproduced. . . . . Chart 4.5a

Hard Copy Pages Reproduced. . . . . Chart 4.5b

V. USER SERVICES

Requests Received and Assigned, Document. . . . . Table 5.1

Requests Received, Document . . . . . Chart 5.1a

Requests Assigned, Document . . . . . Chart 5.1b

Requests Requiring Identification . . . . . Table 5.2

Acquisitions Systems and Reference Requests and Foreign Exchange Activity . . . . . Table 5.3

Acquisitions and Foreign Exchange Documents Received. . . . . Chart 5.3

NASA Literature Search Requests Received and Completed. . . . . Table 5.4

NASA Literature Search Requests Completed . . . . . Chart 5.4

NASA Selective Dissemination of Information (SDI) . . . . . Table 5.5

NASA Selected Current Aerospace Notices (SCAN). . . . . Table 5.6

NASA Decentralized Search Tape Program. . . . . Table 5.7

VI. DOCUMENT REQUESTS COMPLETION SUMMARY

Requests Processed, Document. . . . . Table 6.1

Requests Processed, Document - By Series and Type Furnished . . . . . Table 6.2

Days in Process for Document Requests - From Receipt in the Facility to Mailing . . . . . Table 6.3

Direct Access Requesters, Requests from, Completed. . . . . Table 6.4

Multi-Title and Multi-Copy Requests Processed . . . . . Table 6.5

VII. MISCELLANEOUS

Accession Card Production . . . . . Table 7.1

Accession and Abstract Card Distribution List . . . . . Table 7.2

NASA Tech Brief Activity. . . . . Table 7.3

NASA Tech Brief Activity. . . . . Chart 7.3

TITLES ACCESSIONED - PUBLISHED SERIES - AS OF MARCH 31, 1968

During March, accessioning for regular publications scored a sharp recovery (up 46%) from the substantial drop of the month before with the N10K (STAR) series up 24%, the X10K and X50K (CSTAR) series up 121%, and the A80K (LC) series up 42 percent. Third quarter accessioning for regular publications, while showing an increase of 13% over the third quarter of fiscal 1967, was down 9% from the preceding quarter, continuing the down-trend evidenced in the last 3 quarters. Fiscal year-to-date totals show regular publications accessioning to be well ahead of fiscal 1967 at this time -- with the exception of the N10K (STAR) series which is running at approximately the same level. Irregular publications accessioning for the fiscal year to date is up substantially (71%) from last year.

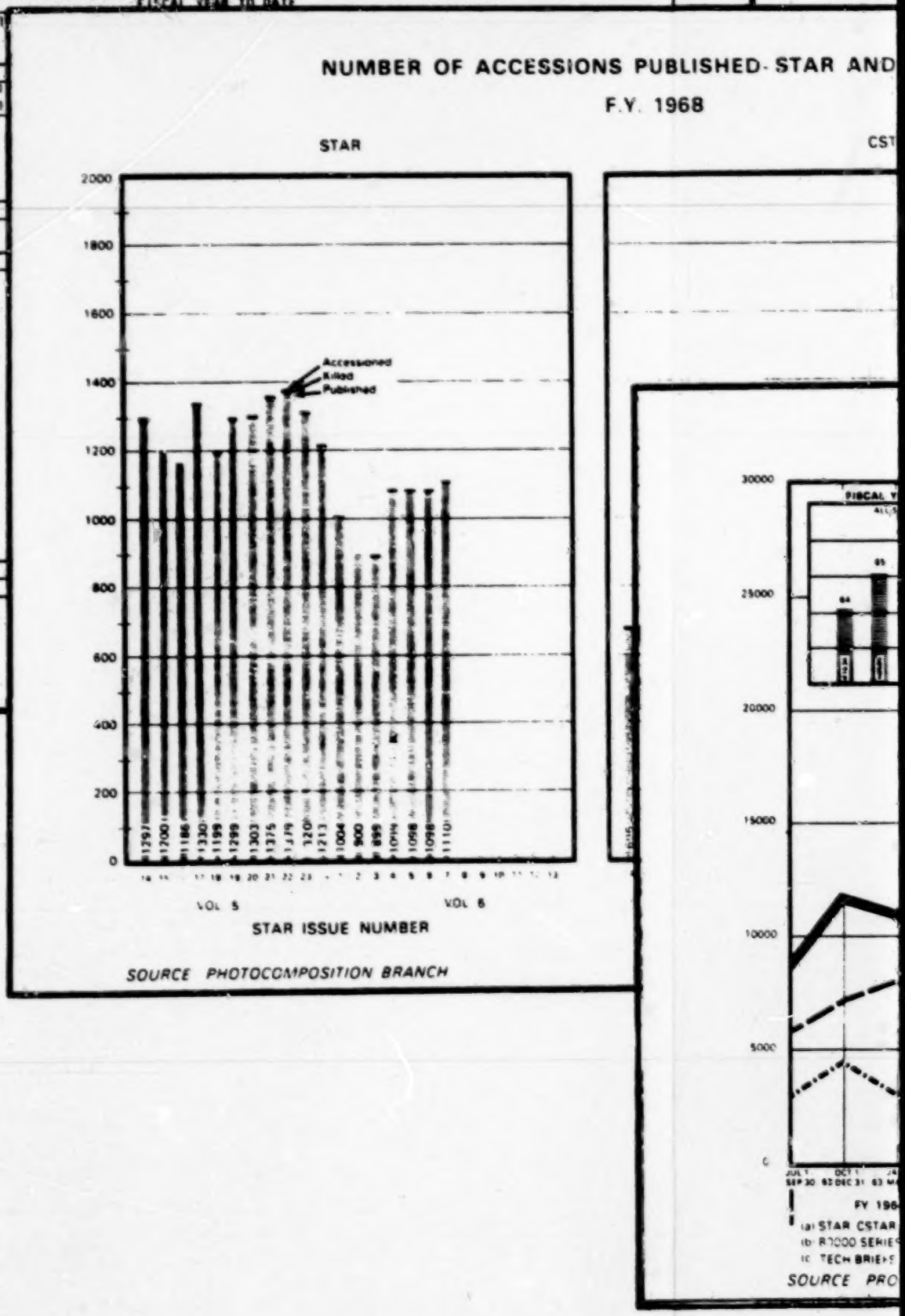
TIME PERIOD			Total All Publications	Regular Publications (a)						Irregular Publications			
				Total	N-10000 (STAR)	X-10000 (CSTAR)	X-50000 (SSTAR)	X-35000 (SAB)	R-10000 (RATR)	A-80000 (LC)	Total	B-10000 (Tech Briefs)	P-10000 (Press Releases)	NASA Management Issuances
(A)			(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
				FISCAL YEAR TO DATE										
1	FY 1968 Thru March 31		37,813	36,363	20,812									
2	FY 1967 Thru March 31		34,885	34,039	21,375									
3	Percent change '68 from '67		+8.4	+6.8	-2.6									
4	1967 - Fiscal Year		50,395	49,230	30,155									
5	1966 - Fiscal Year		50,660	49,528	29,033									
6	Third Quarter FY 1967		9,976	9,852	6,700									
7	Fourth Quarter FY 1967		15,510	15,191	8,780*									
8	First Quarter FY 1968		13,028	12,864	6,907									
9	Second Quarter FY 1968		13,255	12,327	7,071									
10	Third Quarter FY 1968		11,530	11,172	6,834									
11	Preceding Quarter		-13.0	- 9.4	-3.4									
12	One Year Ago		+15.6	+13.4	+2.0									
13	1967	January	3,479	3,442	1,960									
14		February	3,590	3,559	2,600									
15		March	2,907	2,851	2,140									
16		April	5,252	5,160	3,120									
17		May	5,228	5,162	3,100									
18		June	5,030	4,869	2,560									
19		July	3,666	3,619	1,806									
20		August	4,448	4,379	2,436									
21		September	4,914	4,866	2,665									
22		October	4,690	4,628	2,678									
23		November	4,278	4,169	2,475									
24		December	4,287	3,530	1,918									
25	1968	January	3,863	3,739	2,044									
26		February	3,216	3,021	2,143									
27		March	4,451	4,412	2,647									
28	Preceding Month		+38.4	+46.0	+23.5									

* All-time High

(a) Does not include PAR series (Z-10000) canceled July 11,

(b) SAB series cancelled 2-2-68.

Source: Cataloging Branch.



with
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ASA
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ssu-
nces
(M)

PUBLISHED STAR AND CSTAR

Y. 1968

CSTAR

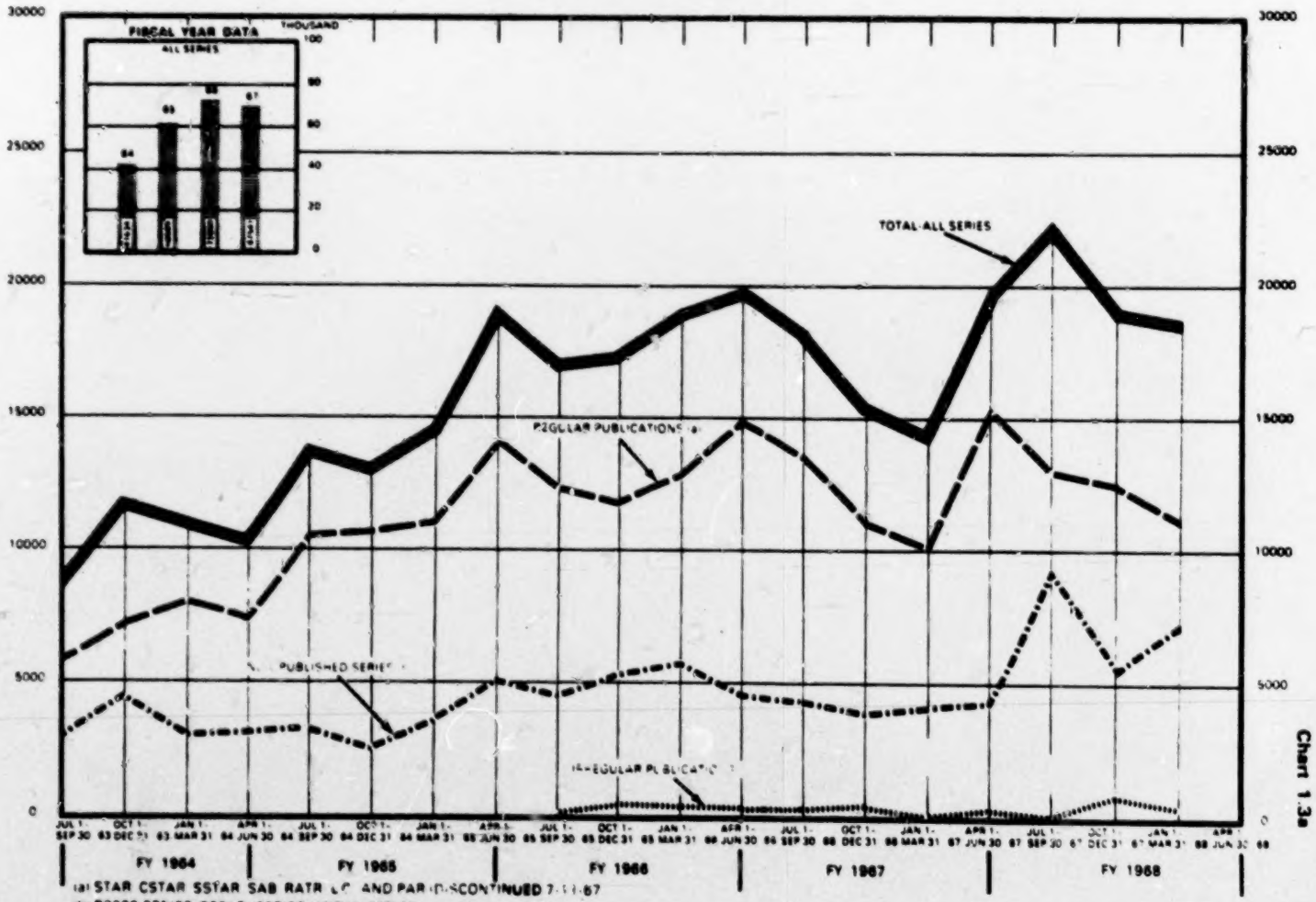
2000

1800

1600

TITLES ACCESSIONED-ALL SERIES

FISCAL YEARS—BY QUARTERS



(a) STAR CSTAR SSTAR SAB RATR [illegible] AND PAR [illegible] DISCONTINUED 7-1-67

(b) R0000 SERIES 9000 SERIES AND W SERIES

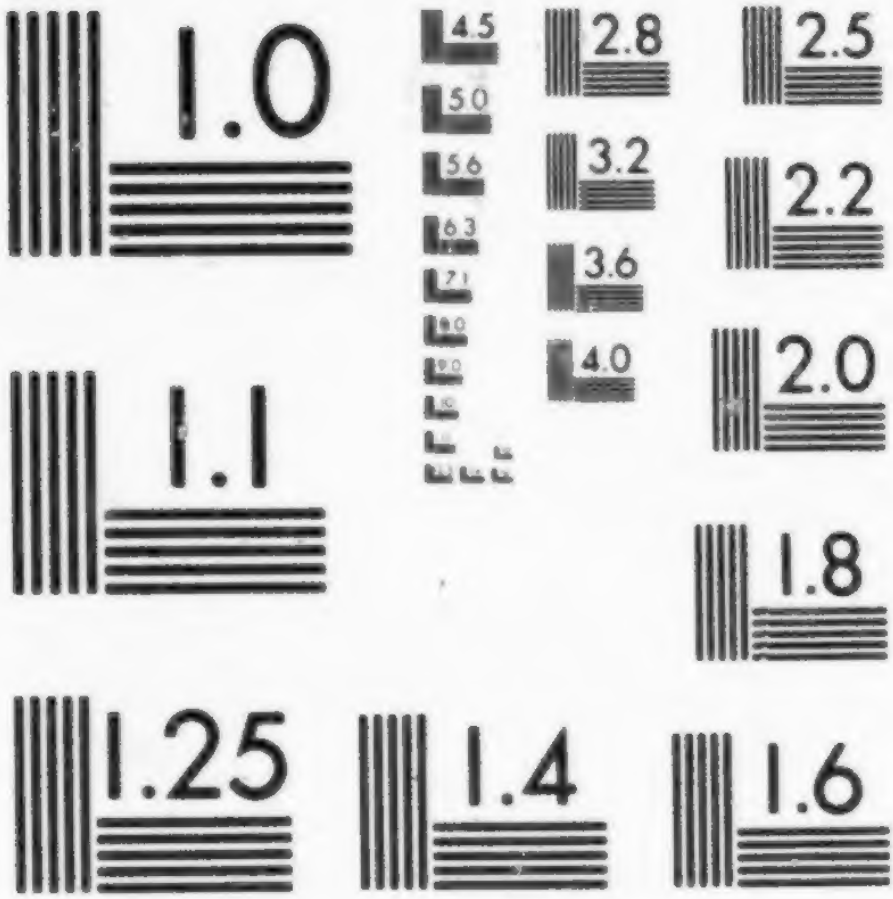
(c) TECH BRIEFS PRESS RELEASES AND NASA MANAGEMENT ISSUANCES

SOURCE PROCESSING DEPARTMENT

Chart 1.3a

[illegible] FIGURE A-3. SAMPLE REPORT ELEMENT

7692



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX L

Typical Validity Lists

NASA FACILITY VALIDITY LIST Revised_____

Direct Labor Charges, Project 003

Unit Cataloging Branch

Division-Section Code 13-10

PRODUCTS		FUNCTIONS	
Management and Supervision	R01	Supervising	102
Clerical Support	R02	Clerical	180
Accessions Distributable	A01	Typing	122
		Tech Writing	150
		Document Accountability	191
		Editing (Training)	173
STAR	B01-B24	Operating Offset Copying Machine	118
CSTAR	C01-C24	Typing	122
CSTAR Sec. Suppl.	C31-C34	Cataloging, Descr.	133
		Cataloging, Descr.w/ Translation	134
SAB (Issues 21-24)	D21-D24	Cataloging, Descr.	133
SAB (Issues 25-36)	D01-D12	Operating Offset Copy Machine	118
PAR (Issues 6-9)	D56-D59		
PAR (Issues 10-14)	D51-D55		
N80,000	E01-E13	Cataloging, Descr.	133
X80,000	E21-E33	Cataloging, Descr. w/ Translation	134
N90,000	E41-E53		
X90,000	E61-E73		
CARA	F35	Typing	122
		Filing	123
CCN	F30	Typing	122
News Releases	S12	Cataloging, Descr.	133
Management Data	L02	Clerical	180

ERIC FACILITY

PRODUCT NUMBER VALIDITY LIST

November, 1970

Sheet 1

Input Activities	Issue	Product	Issue	Product	Issue	Product
RIE - Regular Report Resumes	Dec.	R12	Jan.	R01	Feb.	R02
- Irregulars (QAD's & IBE)	Dec.	R62	Jan.	R51	Feb.	R52
- Project Resumes - NEW	Dec.	P12	Jan.	P01	Feb.	P02
AUTHORITY FILES - Descriptors	Dec.	D12	Jan.	D01	Feb.	D02
- Source Codes/Names	Dec.	S12	Jan.	S01	Feb.	S02
CIJE - Journal Articles	Nov.	J11				
CPI - Project Resumes - CHANGES	Nov.	P31				
FIELD READER - NEW	Nov.	F11				
- CHANGES	Nov.	F31				
CH ACQUISITIONS DATA	Sept-Oct.	C10				
OTHER INPUT						

EFF-8.1 (11/70)

LS&R

ERIC FACILITY

PRODUCT NUMBER VALIDITY LIST

November, 1970

Sheet 2

Output Activities	Issue	Product	Issue	Product	Issue	Product
COMPUTER - Linotron Tape RIE	Dec.	Y12	Jan.	Y01		
- Linotron Tape RIE Annual	Annual	Y32				
- Single Frame Resume RIE	Dec.	H12	Jan.	H02		
- SFR						
- Bureau Number Index	Dec.	T92	Jan.	T81	Feb.	T82
- Report Number Index	Dec.	T72	Jan.	T61	Feb.	T62
- Thesaurus	N/A					
- Source Directory	N/A					
- CH/ED Cross-Reference	Dec.	T52	Jan.	T41	Feb.	T42
-						
-						
PRINTING & SHIPPING - Bureau No. Index	Dec.	M92	Jan.	M81	Feb.	M82
- Report No. Index	Dec.	N12	Jan.	N01	Feb.	N02
- Thesaurus	N/A					
- Source Directory	N/A					
- CH/ED XREF	Dec.	M52	Jan.	M41	Feb.	M42
- Acquisition Data	Sept.-Oct.	M70				
-						
-						
-						
OTHER - Documents/Resumes to EDRS	Dec.	G12	Jan.	G01	Feb.	G02
- EDRS Microfiche Filing	Dec.	G62	Jan.	G51	Feb.	G52
-						

APPENDIX M

Input Forms

Basic Time Card

LEASCO SYSTEMS & RESEARCH CORPORATION

EMPLOYEE NAME					LINE TOTALS REG HOURS	LINE TOTALS OVERTIME REG HRS	LINE TOTALS OVERTIME PREM HRS	EMPL. NO.	ORG. NO.	WEEK ENDING			WK. NO.	
SHIFT	PROJECT	PRODUCT	FUNCTION	ACCOUNT				SUN	MON	TUE	WED	THUR	FRI	SAT
HOLIDAY TAKEN				216										
ANNUAL LEAVE TAKEN				215										
SUB-TOTALS FROM REVERSE SIDE														

I certify that the time shown hereon represents an accurate record of hours worked for projects and accounts indicated.

Signed: _____ Date: _____

TOTAL REGULAR | TOTAL OVERTIME | APPROVED: _____ CHECK ACCURACY!

APPENDIX M
Page Two

Modified Time Card

LEASCO *SYSTEMS & RESEARCH CORPORATION*

DOUGLAS S PRICE — EMPLOYEE NAME — LINE TOTALS: REGULAR HOURS / OVERTIME HOURS

0058 — EMPL. NO. | 1100 — ORG. NO. | 9/30/68 — WEEK ENDING | 01 — WK. NO.

SHIFT	PROJECT	PRODUCT	FUNCTION	ACCOUNT	REGULAR HOURS	OVERTIME HOURS	SUN	MON	TUE	WED	THUR	FRI	SAT
	007	R10	302	001	32 0				8 0	8 0	8 0	8 0	
	007			001									
	007			001									
	007			001									
	007			001									
	007			001									
	——	Holiday Taken		222									
		Annual Leave Taken		221									
SUB-TOTALS FROM REVERSE SIDE					8 0			8 0					
					0			8 0	8 0	8 0	8 0	8 0	

I certify that the time shown hereon represents an accurate record of hours worked for projects and accounts indicated.

Signed D. S. Price/ams

TOTAL REGULAR | TOTAL OVERTIME

APPROVED K.S. [illegible] CHECK ACCURACY!

LEASCO *SYSTEMS & RESEARCH CORPORATION*

SHIFT	PROJECT	PRODUCT	FUNCTION	ACCOUNT	LINE TOTALS: REGULAR HRS	LINE TOTALS: OVERTIME HOURS	SUN	MON	TUE	WED	THUR	FRI	SAT
	007			001									
				001									
1	871	500	302	001	8 0			8 0					
				001									
				001									
	007		SICK LEAVE	007									
	007		ADMINIS-TRATIVE	008									

LEA 7 REV. 7/68

PROCESSING THRUPUT
Descriptive Cataloging

	TOTAL	STAR N10K		CSTAR X10K		30K	X50K	80K	90K	Flash Sheets
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(J)	(K)
SUE										
Previous Balance										
Received										
Completed-TOTAL										
Cataloged										
Killed										
New Balance										
Aging										

PROCESSING THRUPUT
Microform Master Preparation

	TOTAL	STAR N10K	CSTAR X10K	X50K	LOAN DOCUMENTS ONLY 80K	90K	Reque
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
1. Previous Balance							
2. Received - TOTAL							
3. Less NMF to Case File							
4. Less Analytic Daughters							
5. Received - NET							
6. Completed - TOTAL							
7. Titles Forwarded							
8. Killed							
9. New Balance							
10. Cards Forwarded							
11. Aging							

Documents Photographed

	DISTRIBUTION CODE											
	1	2	2a	2b	2c	2d	3	4	4a	4b	4c	4d
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
1. Titles												
2. Pages												

REQUEST PROCESSING BRANCH

Thruput Statistics

Previous Balance

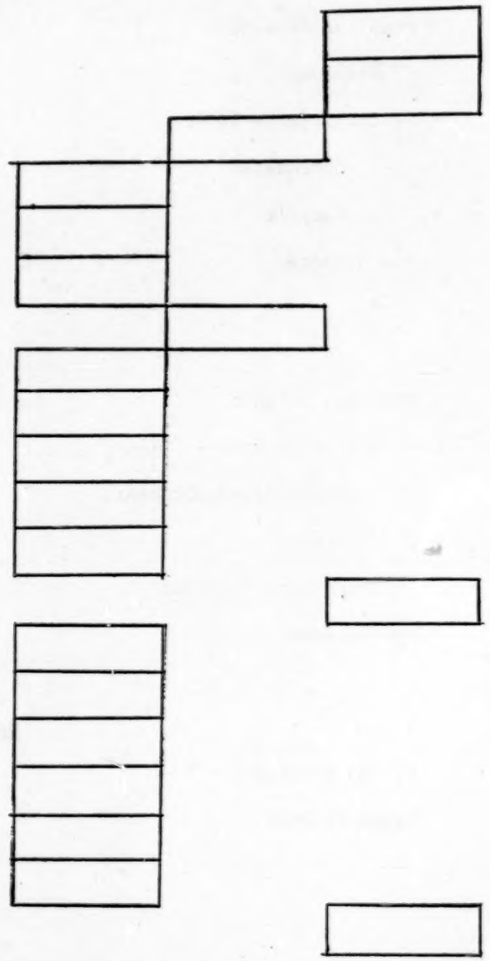
Receipts

- Regular
  - NASA Requests
  - Direct Access Requests
  - Other Requests
- Recycle
  - From Unclassified Stock
  - From Classified Stock
  - From Acquisitions
  - From Reproduction
  - From NASA Suspense

Output

- To Unclassified Stock
- To Classified Stock
- To Acquisitions
- To Reproduction
- To NASA Suspense
- To Requester

New Balance



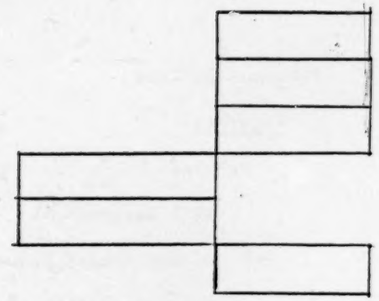
REQUEST ACTIVITIES

Reproduction

Previous Balance

- Received
- Completed - TOTAL
  - Reproduced
  - Recycle

New Balance

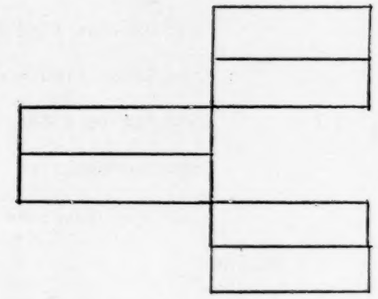


Hold for Microform

Previous Balance

- Placed in Hold - TOTAL
  - Accessioned Documents
  - Others
- Microforms Received

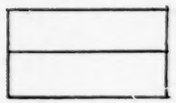
New Balance



Hard Copy Production

Titles Printed

Pages Printed



APPENDIX N

Production Schedules

OVERALL SYSTEMS THROUGHPUT SCHEDULE

I. PROCESSING AND JOURNAL PRODUCTION

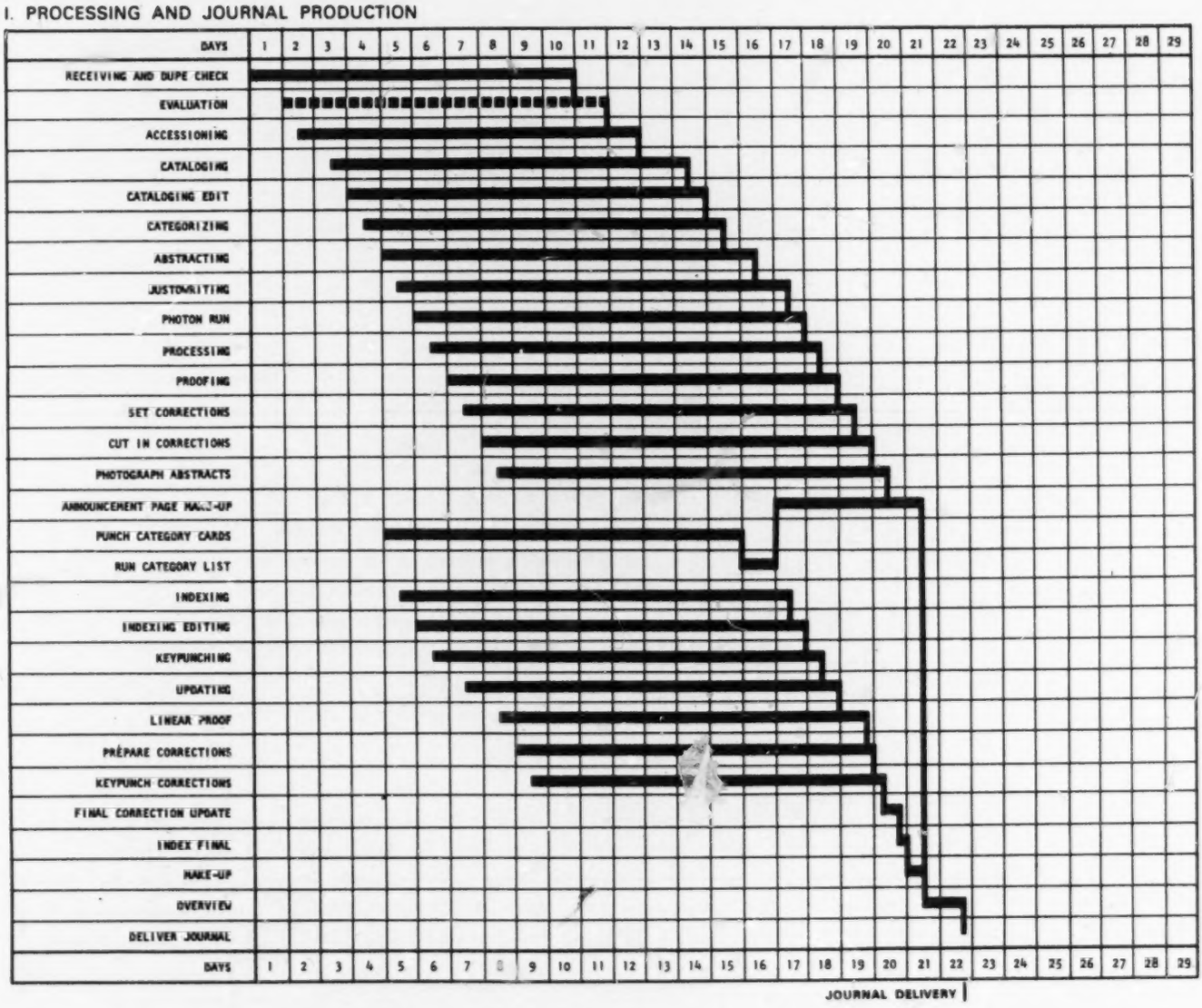
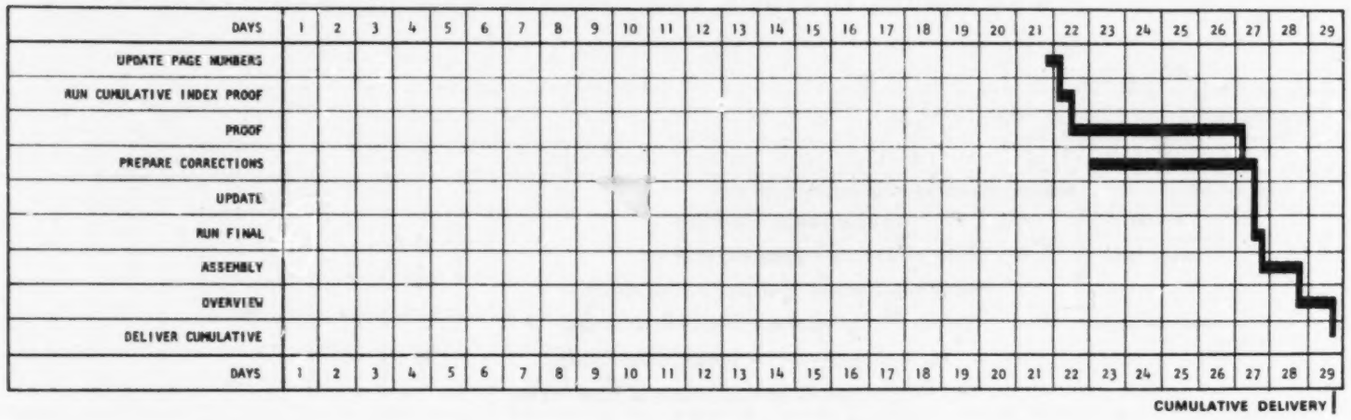


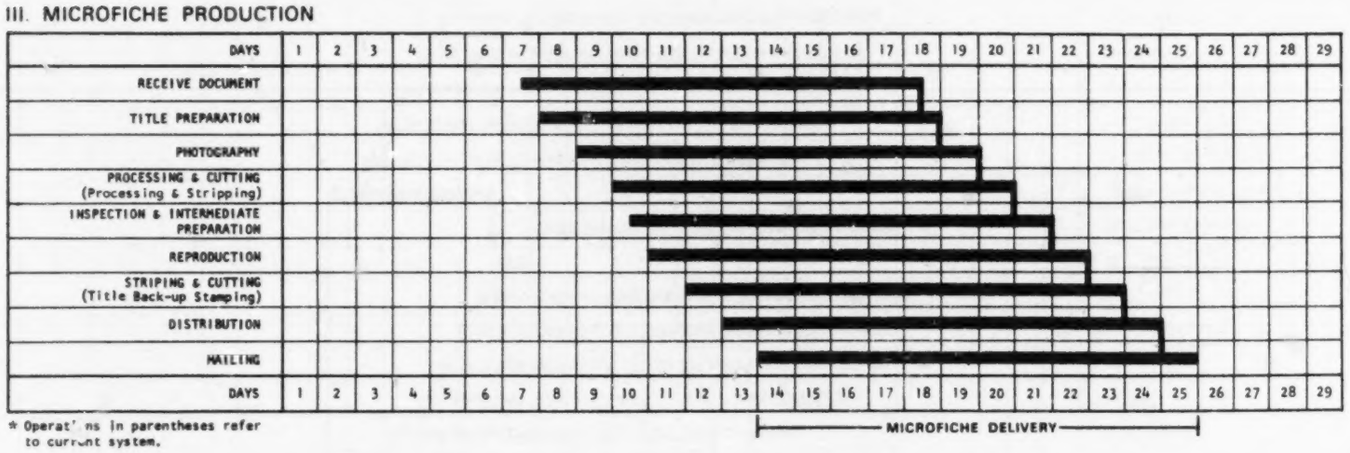
Fig 38

OVERALL SYSTEMS THROUGHPUT SCHEDULE

II. CUMULATIVE INDEX PRODUCTION


DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
UPDATE PAGE NUMBERS
RUN CUMULATIVE INDEX PROOF
PROOF
PREPARE CORRECTIONS
UPDATE
RUN FINAL
ASSEMBLY
OVERVIEW
DELIVER CUMULATIVE
DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
CUMULATIVE DELIVERY

III. MICROFICHE PRODUCTION


DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
RECEIVE DOCUMENT
TITLE PREPARATION
PHOTOGRAPHY
PROCESSING & CUTTING (Processing & Stripping)
INSPECTION & INTERMEDIATE PREPARATION
REPRODUCTION
STRIPING & CUTTING (Title Back-up Stamping)
DISTRIBUTION
MAILING
DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
MICROFICHE DELIVERY

* Operat' ns in parentheses refer to current system.

IV. SELECTIVE DISSEMINATION OF INFORMATION

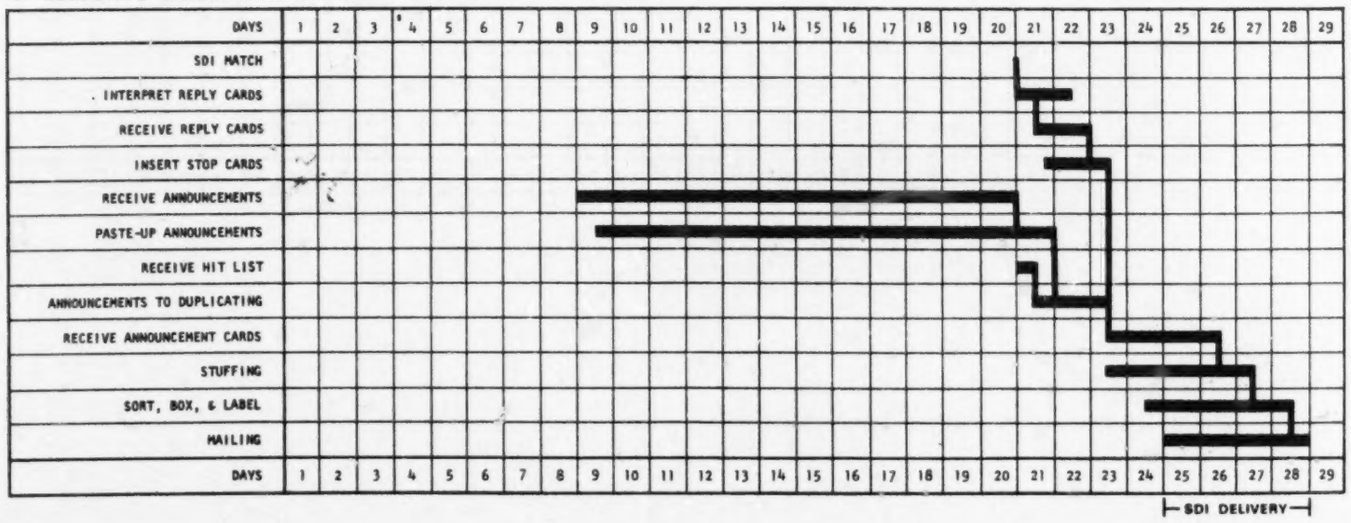
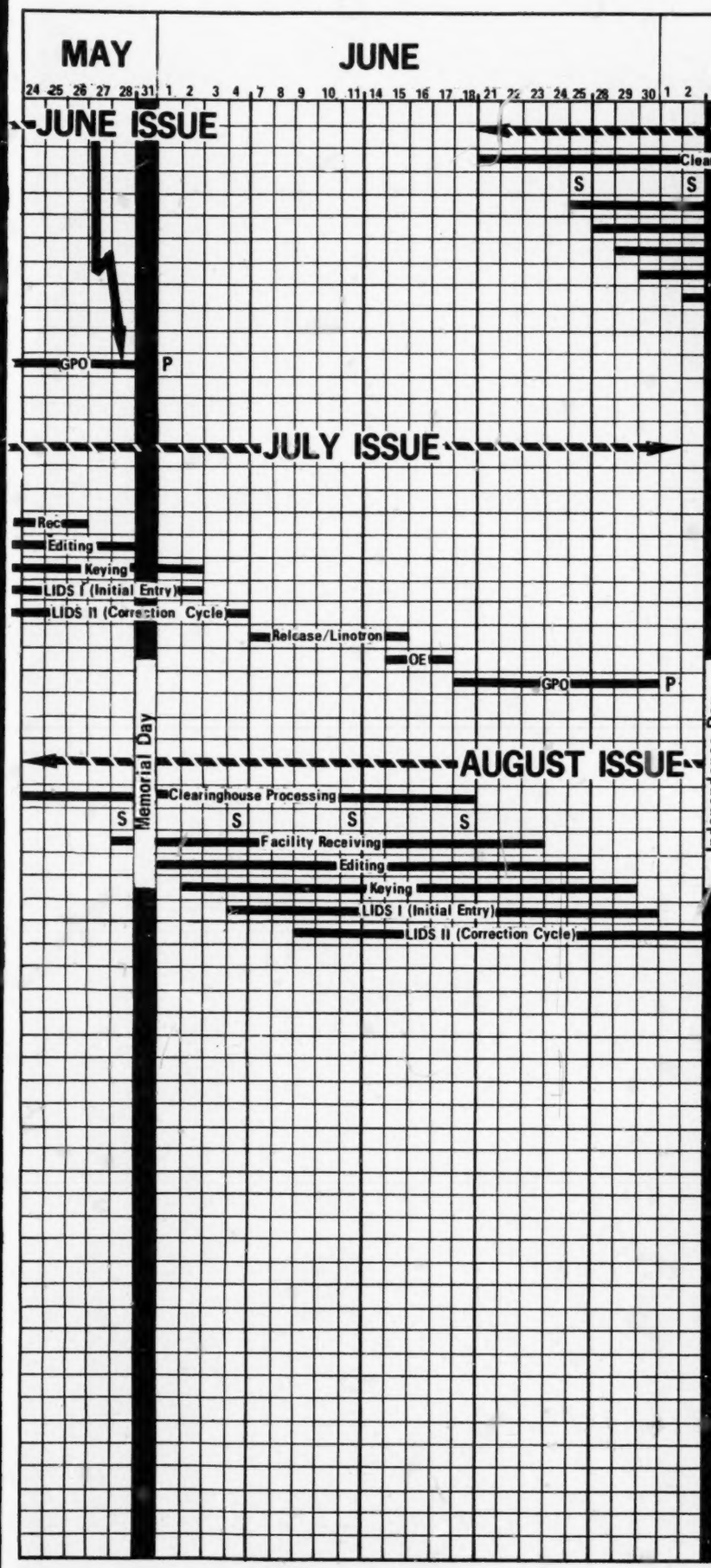
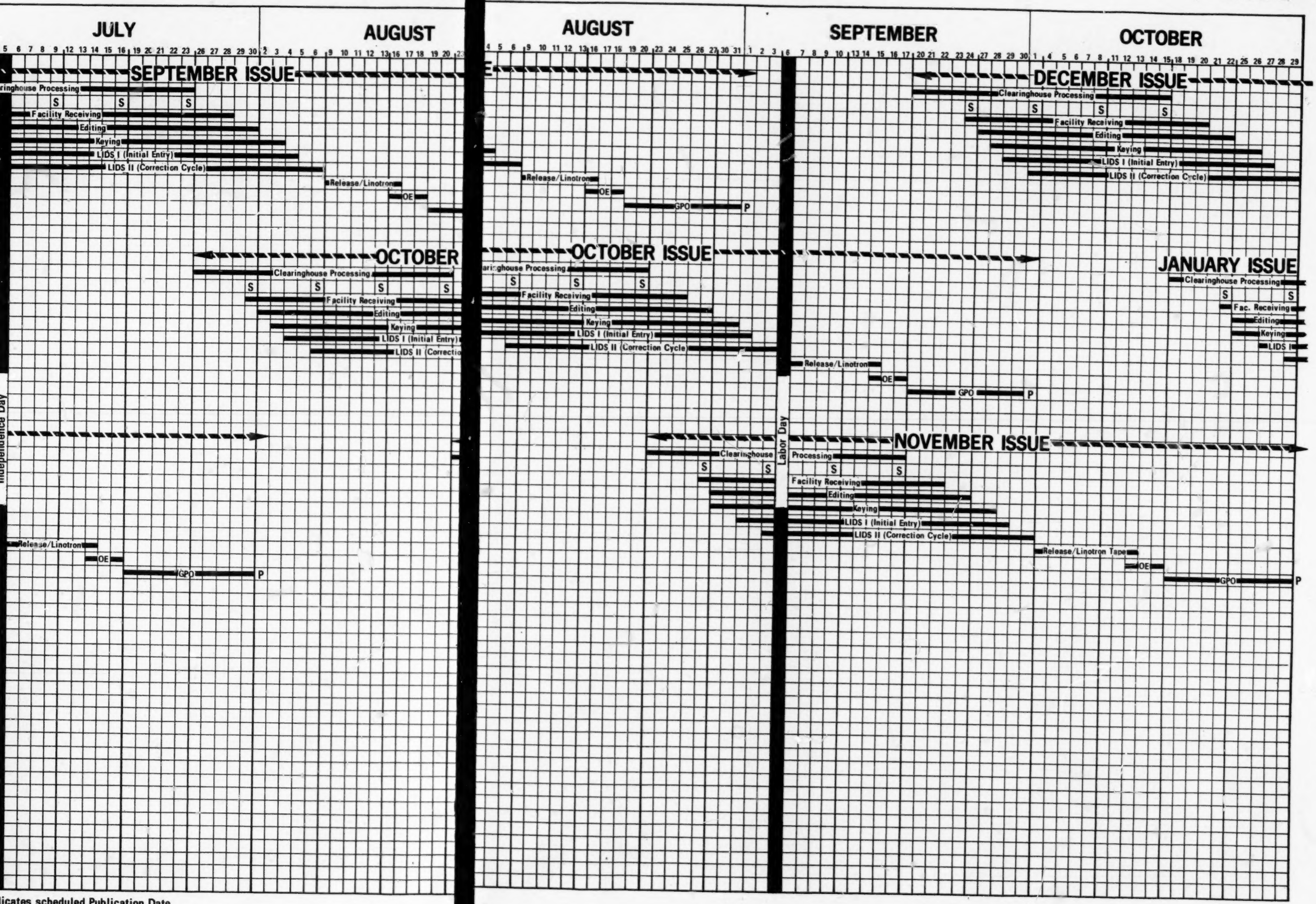

DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
SDI MATCH
. INTERPRET REPLY CARDS
RECEIVE REPLY CARDS
INSERT STOP CARDS
RECEIVE ANNOUNCEMENTS
PASTE-UP ANNOUNCEMENTS
RECEIVE HIT LIST
ANNOUNCEMENTS TO DUPLICATING
RECEIVE ANNOUNCEMENT CARDS
STUFFING
SORT, BOX, & LABEL
MAILING
DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
SDI DELIVERY

Fig. 39.
Throughput Schedule—Cumulative Indexes, Microfiche, and SDI



EFF 7(11/70) S indicates Clearinghouse Shipping Dates P in

ERIC MASTER SCHEDULE - 1971



Indicates scheduled Publication Date

LSSA

708

PROJECT ANNOUNCEMENT JOURNAL SCHEDULES

ACTIVITY TITLE NOVEMBER 11, 1964 — MARCH 12, 1965

ACTIVITY DESCRIPTION		NOVEMBER 1964	DECEMBER 1964	JANUARY 1965	FEBRUARY 1965
		11 12 13 16 17 18 19 20 23 24 25 26 27 30	1 2 3 4 7 8 9 10 11 14 15 16 17 18 21 22 23 24 25 28 29 30 31	1 4 5 6 7 8 11 12 13	1 4 5 6 7 8 11 12 13 14 15 18 19 20 21 22 25 26 27 28 29	1 2 3 4 5 8 9 10 11 12 15 16 17 18 19
IAA-5-1	S		8 IF	P	P
	P			JAN. 1	JAN. 1
STAR-3-1	S	X	CO IP IF D	P	P
	P				
CSTAR-3-1	S		X CO IP IF D		P
	P				
AEROSPACE MED. #6	S	X	CO IP IF	D	D
	P				
IAA-5-2	S		B IF		P
	P				
STAR-3-2	S		X CO	IP IF D	IP IF D P
	P				JAN. 23
CSTAR-3-2	S		X CO	IP IF CO	IP IF D P
	P				JAN. 31
SAB ~~2-1~~ 13	S		X CO	IP IF CO	IP IF D
	P				
IAA-5-3	S				B IF P
	P				
STAR-3-3	S		X	CO	CO IP IF D P
	P				
CSTAR-3-3	S			X	X CO IP IF D P
	P				
AEROSPACE MED. #7	S		X		CO IP IF D
	P				
IAA-5-4	S				B IF P
	P				
STAR-3-4	S			X	X CO IP IF D
	P				
CSTAR-3-4	S				X CO IP IF D
	P				
SAB ~~2-2~~ 14	S			X	X CO IP IF D
	P				
IAA-5-5	S				B IF
	P				
STAR-3-5	S				X CO IP IF D
	P				
CSTAR-3-5	S				X CO IP
	P				
AEROSPACE MED. #8	S				X CO IP
	P				

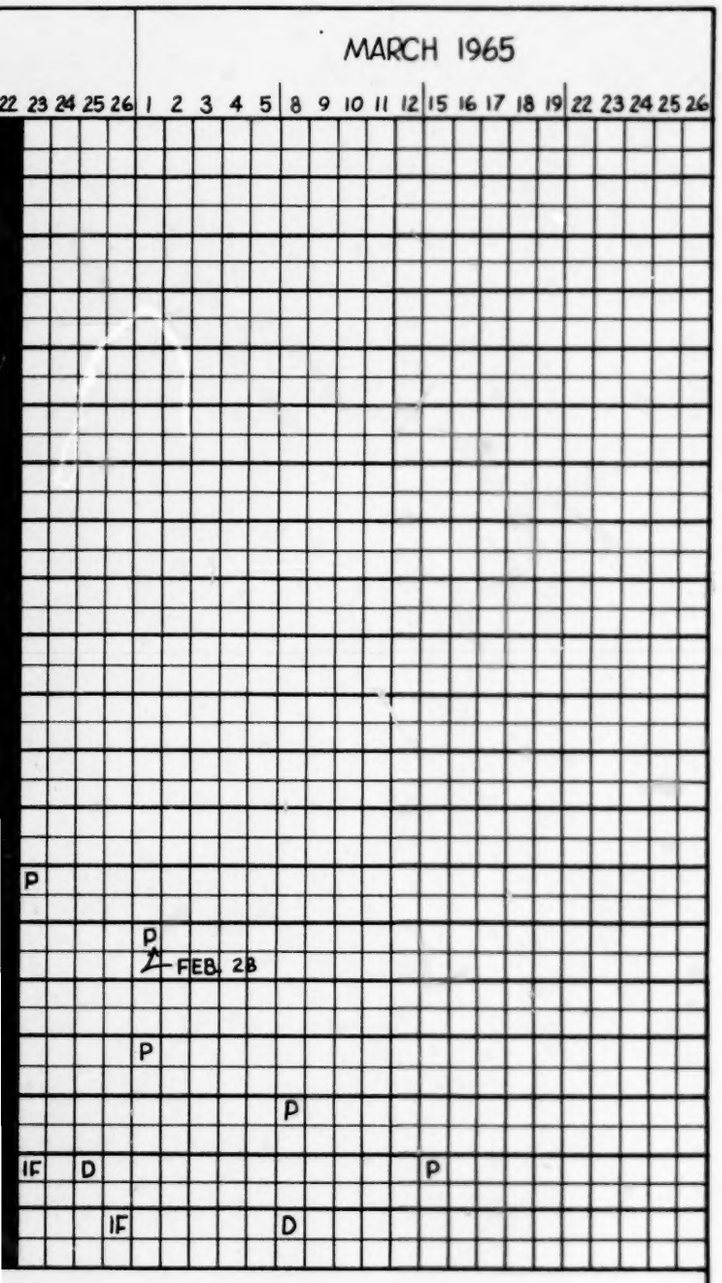
LEGEND:
D = DELIVERY DATE
CO = CUTOFF DATE
IP = INDEX PROOF DATE
IF = INDEX FINAL DATE
X = START ACCESSIONING
P = PUBLICATION DATE
B = DELIVERY OF IAA CARDS

REMARKS:

C. INC. FORM NO. 11 SCHEDULE AND PROGRESS ACTIVITIES CHART

APPENDIX N
Page Four

REVISED NOVEMBER 12, 1964



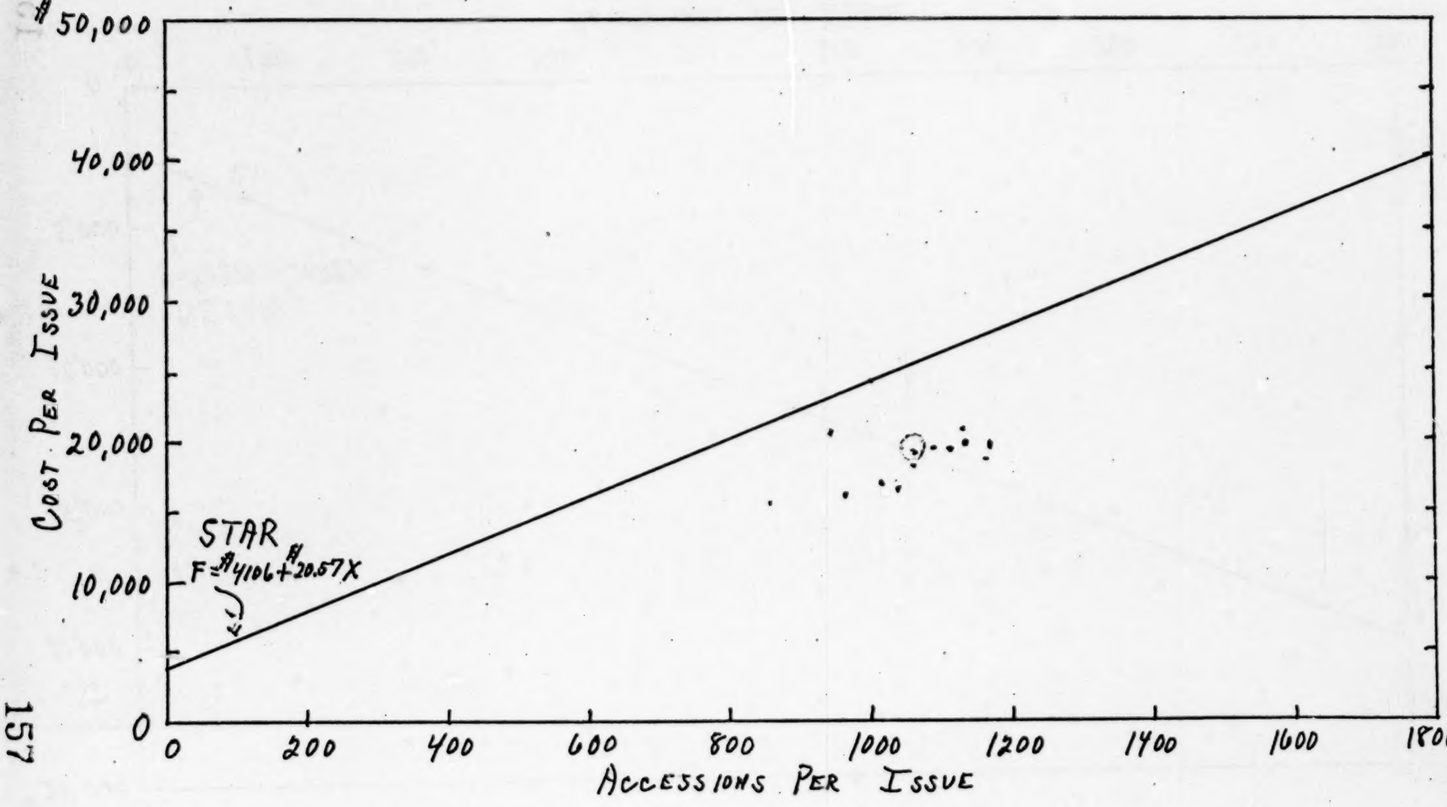
PAGE 1 OF 6

68W

APPENDIX P

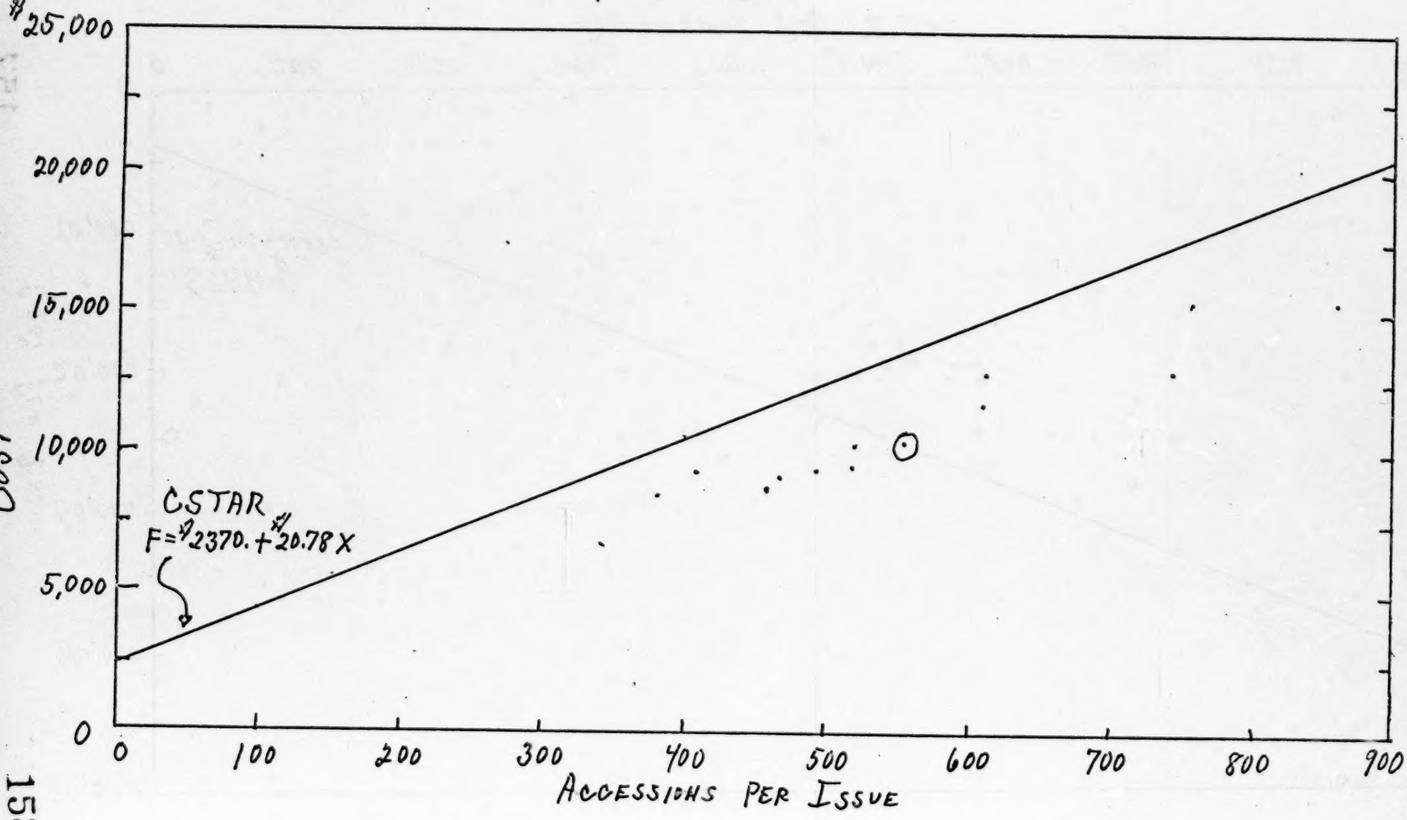
Cost and Volume Projections

Cost of STAR
By size of Issue



APPENDIX P
Page One

Cost of CSTAR
By size of Issue



APPENDIX P
Page Two

MICROFICHE MASTERS PREPARED

FISCAL YEARS 1964–1969, BY QUARTERS

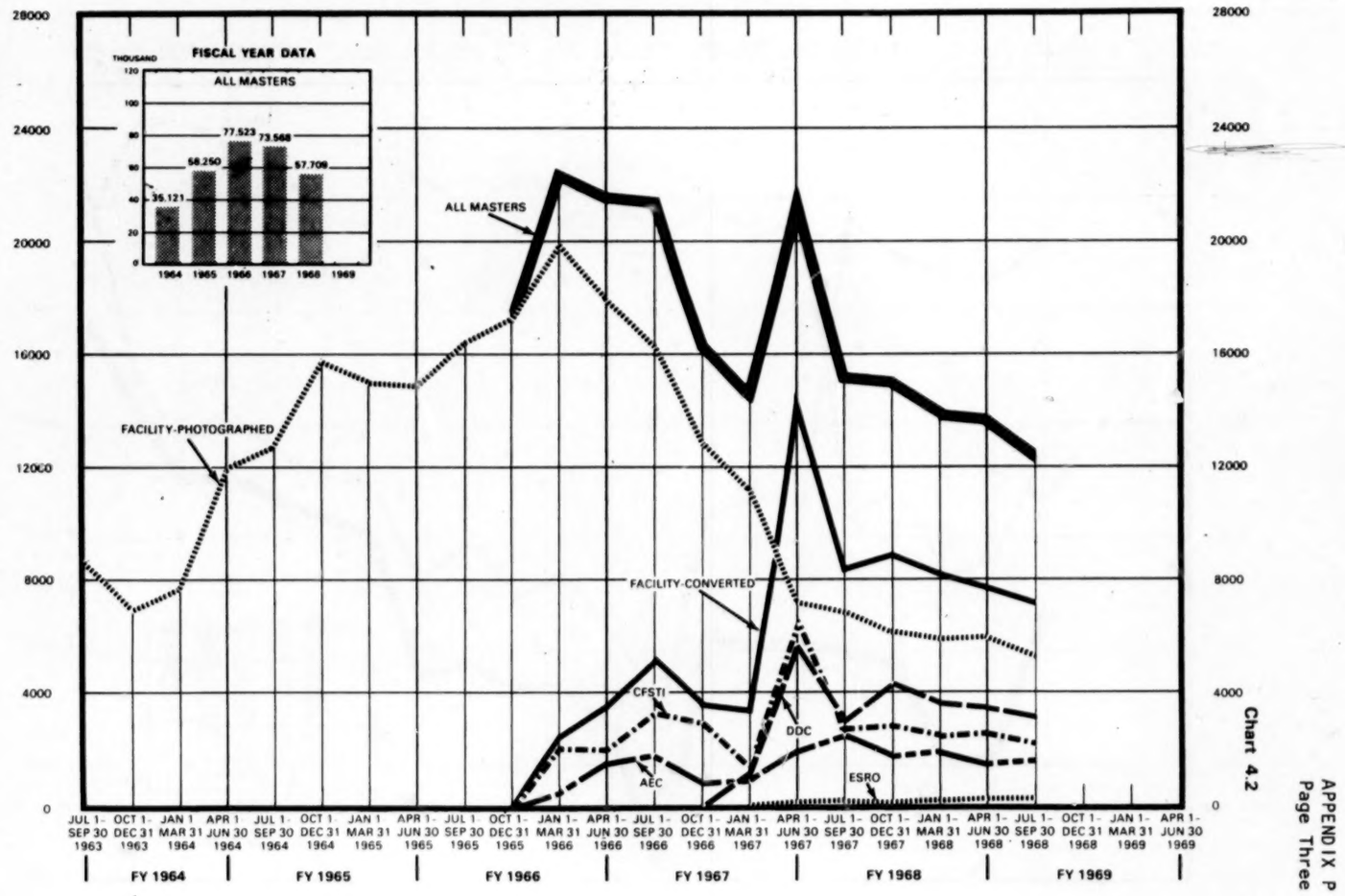


Chart 4.2

APPENDIX P
Page Three

SOURCE: MICROFICHE PRODUCTION BRANCH

HARD COPY PAGES REPRODUCED

FISCAL YEARS 1964–1969, BY QUARTERS

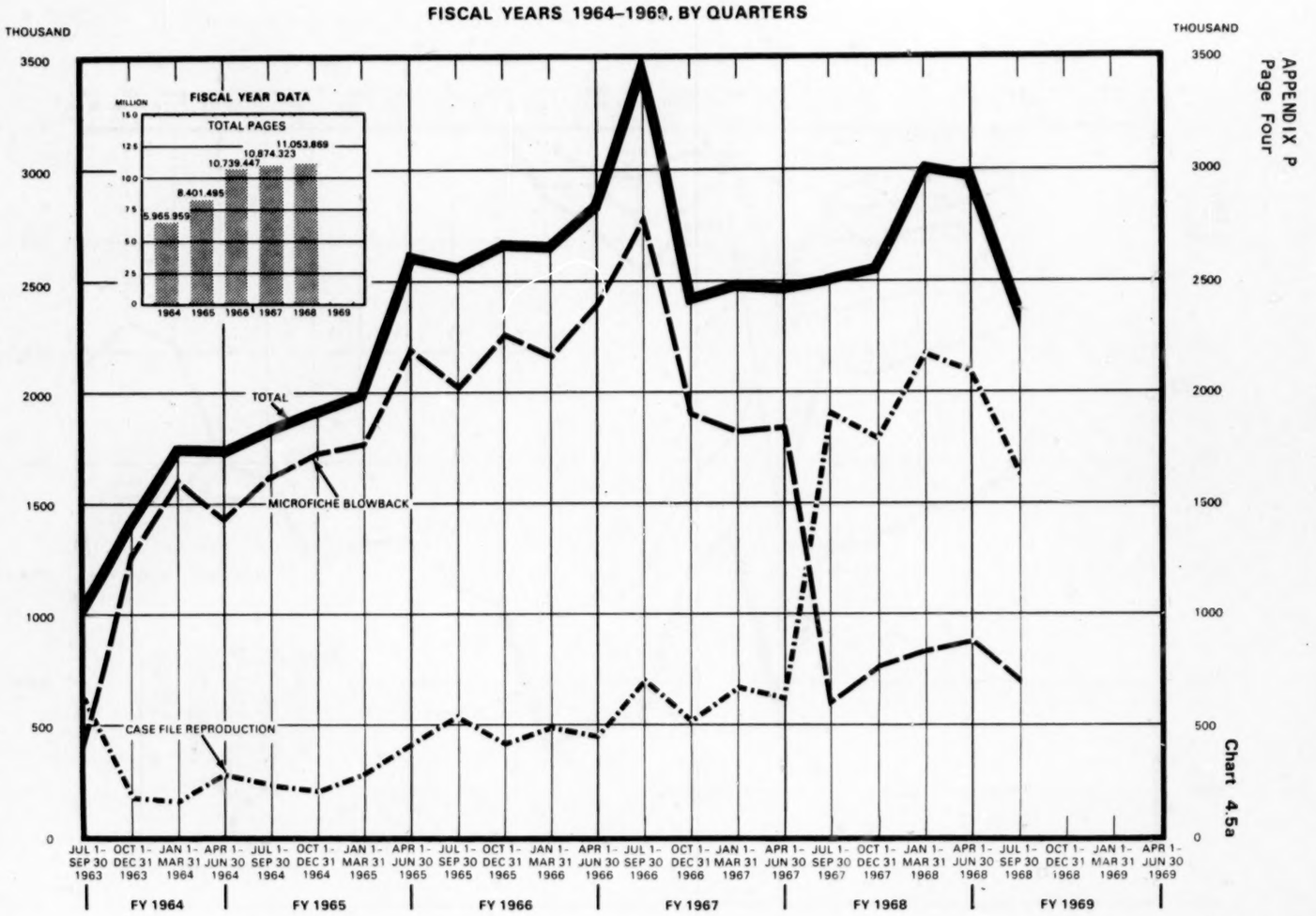


Chart 4.5a

APPENDIX P
Page Four

SOURCE: REPRODUCTION & DUPLICATION BRANCH

EN
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DATE

ND
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